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ROYAL BOTANIC GARDENS, KEW

XIX.—REVISION OF THE OLD WORLD SPECIES OF BUDDLEJA.

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Distribution.

The genus *Buddleja* has a wide distribution extending throughout most of the warmer parts of Asia, Eastern and Southern Africa, and both North and South America. The present work excludes the New World species. There are no representatives of the genus wild in Europe, Northern Asia or Australasia, while all Mascarene species which have been placed in *Buddleja* are considered to belong to the allied genus *Nicodemia*, which differs in having a berry instead of a capsule. In every species from the Mascarene Islands in which the fruit is known this has been found to be the case. As in so many genera, the largest number of species is to be found in the Chinese province of Yunnan.

The interesting " Alternifoliae," which alone in the Loganiaceae have alternate leaves, are confined to Tibet and the borders of Western China* where all the species are normally deciduous. One species (*B. polystachya*) is common to Arabia and East Africa, and only three other species are African.

The altitudinal range of the genus extends from the Plains of India (1000 ft.), to the windswept Tibetan Plateau (12,000 ft.), but most of the species occur in the temperate zone.

Taxonomy.

Among the species included in this work, *B. gynandra* stands out as very distinct in the position of the androecium. Apart from this, the genus is a very natural one and not readily subdivided according to natural relationship.

The Sections and Series adopted by Bentham (in DC. Prodr.) and accepted by Engler (in Nat. Pflanzenfam.) are scarcely satisfactory when applied to the greatly increased number of Asiatic species now known. The following Series are proposed as convenient for the Old World species :—

§ Gynandrae—Corolla tube straight. Stamens free from the corolla tube. Leaves opposite (Sp. 1).

§ Alternifoliae (Kränzl. in Bull. Jard. Bot. Pétersb. xiii. 89 (1913), as a *Section*)—Corolla tube straight. Stamens inserted on the corolla tube. Leaves alternate. (Spp. 2–6).

*Except *B. amentacea* Kränzl., the origin of which is doubtful (see p. 184).

§ Curviflorae—Corolla tube curved. Stamens inserted on the corolla tube. Leaves opposite (Spp. 7–11).

§ Rectiflorae—Corolla tube straight. Stamens inserted on the corolla tube. Leaves opposite (Spp. 12–52).

For many years after its discovery *B. alternifolia* Maxim. was the only species with alternate leaves known in the family Loganiaceae. In 1913 Kränzlin described, in Bull. Jard. Bot. Pétersb. xiii. 89, a species of uncertain origin based on a single incomplete specimen, and proposed the name '*Alternifoliae*' for a Section of the genus to include the alternate-leaved species. The discovery of *B. Wardii*, however, in which some of the branches bear alternate leaves and others opposite, has shown that too much importance should not be attached to this character in the primary division of the genus.

Since the whole genus is not under review, no attempt is made here to discuss its systematic position. Originally placed in the Scrophulariaceae by Bentham, Lindley and other authors, it was transferred to the Loganiaceae in Benth. et Hook. f. Gen. Plant., and placed in the tribe Euloganieae which is now its accepted position.

The generic name has been spelt in a variety of ways by different authors. That adopted in the present work is the original (see Sprague in *Kew Bull.* 1928, p. 349).

Of the species coming within the scope of this Revision, all are shrubs except *B. Colvilei*, which is unique in its very large flowers and becomes a considerable sized tree in the Sikkim Himalaya; and *B. salviifolia*, which is not uncommon throughout a wide area in Africa, and though normally a shrub, has been reported to attain the girth of a tree in one locality.

Unfortunately in a number of cases it has not been possible to obtain fruiting specimens for examination, so a classification of the genus on the seed characters is impossible at the present time, but a sufficient number of species are known in fruit to indicate that there is no correlation between the position of the anthers and the character of the seed. This is seen at once in the following table :—

Seeds not tailed.		Seeds shortly tailed.		Seeds with long tails.	
Lindleyana	B	alternifolia	M	albiflora	T
paniculata	T	japonica	B	nivea	T
asiatica	M	Colvilei	T	macrostachya	T
salviifolia	M	Forrestii	T	Hookeri	T
heliophila	M	Griffithii	T	Davidii	M
tibetica		limitanea	M	officinalis	M
var. Farreri	M	Fallowiana	M	myriantha	M
				stenostachya	M

(Reference to insertion of stamens: B = near base, M = near the middle, T = near the throat of the corolla tube.)

The leaves in some species of this genus exhibit a particularly wide range of fluctuation in size, due to external conditions, especially soil moisture, so that cultivated plants are frequently very

different in appearance from the wild specimens. In some species a great range of leaf-form may be found on a single plant, some of the leaves having winged petioles and others not winged. Similarly the indumentum has been found to be variable to a certain extent. This variation in response to environment is one of the greatest difficulties in determining the limits of the species, especially when the material is scanty.

From the dissection of a very large number of flowers, the position of insertion of the stamens on the corolla tube has been found to be a most important character in this genus, being constant for each species. The shape of the corolla-tube is used to divide the genus into Series and also to separate the species. On the other hand, the corolla-lobes vary much within the same species. The indumentum of the ovary and corolla are also specific characters, though subject to slightly more variation. The flower-colour is almost invariably lost in drying, the corollas becoming blackish in many species.

The flowers of most species are strongly fragrant and are much visited by insects, particularly Lepidoptera. Several hybrids are known in gardens. Some of these were intentionally produced between Asiatic and American species of no close affinity such as *B. Fallowiana* × *B. globosa*, but no scientific genetical study of the genus has been made, nor has the cytology of any of the species been investigated to the author's knowledge.

In the present paper, 52 species and 22 varieties are recognised. Five species are described here for the first time.

Material and Acknowledgments.

The basis of the present work has been the material in the Herbarium of the Royal Botanic Gardens, Kew, but "types" of nearly all the species unrepresented at Kew have been received on loan for study through the kindness of those in charge of the following Institutions: Arnold Arboretum, U.S.A.; Botanical Museum, Berlin; Herbarium, Botanical Garden, Breslau; Royal Botanic Garden, Edinburgh; Rijks Herbarium, Leiden; Herbarium, Principal Botanical Garden, Leningrad; Muséum d'Histoire Naturelle, Paris; National Herbarium, Pretoria, South Africa.

The author wishes to acknowledge his indebtedness to all who have assisted in this way and particularly desires to express his thanks to Professor W. Wright Smith for most generously handing over to him some notes he had made on the species in cultivation at the Royal Botanic Garden, Edinburgh.

Buddleja [*Houst.* ex Linn. Gen. ed. 1, 26 (1737)] *Linn.* Sp. Pl. ed. 1, 112 (1753); Gen. Pl. ed. 5, 51 (1754); Benth. & Hook. f. Gen. Pl. ii. 793 (1876).

Stamens inserted on the ovary, free from the corolla tube.....
1. *gynandra.*

Stamens inserted on the corolla tube :

Leaves alternate (on some branches more or less opposite in *B. Wardii*) :

Flowers 3 mm. in length ; leaves linear-lanceolate attenuate to a very narrow apex (the upper alone known), 10 cm. long...
2. *amentacea.*

Flowers exceeding 6 mm. in length ; leaves small, not linear-lanceolate :

Lamina entire, thin, upper surface glabrous ; midrib inconspicuous on lower surface.....3. *alternifolia.*

Lamina sinuate-dentate, thick, upper surface densely stellate-tomentose ; midrib conspicuous on lower surface :

Ovary glabrous :

Corolla pale pink, about 5 mm. long ; tube less than 1 mm. in diameter.....4. *Legendrei.*

Corolla cream coloured, about 10 mm. long ; tube 1·5–2 mm. in diameter.....5. *tsetangensis.*

Ovary tomentose.....6. *Wardii.*

Leaves always opposite :

Corolla tube curved :

Stamens inserted near the base of the corolla tube ; stem tetragonous, winged :

Leaves small (under 8 cm. in length) ; flowers deep red or violet purple ; exterior of corolla glandular, not tomentose ; fruit small.....7. *Lindleyana.*

Leaves large (10–20 cm. in length) ; flowers pale lilac ; exterior of corolla tomentose ; fruit large...8. *japonica.*

Stamens inserted near the middle of the corolla tube ; stem terete without wings :

Inflorescence elongate, up to 25 cm. long ; ovary glabrous, leaves large :

Leaves membranous, persistent ; exterior of the corolla stellate tomentose.....9. *curviflora.*

Leaves more or less coriaceous, deciduous ; exterior of the corolla glandular.....10. *venenifera.*

Inflorescence subcapitate ; ovary pilose above, leaves minute..... 11. *Purdomii.*

Corolla tube straight :

Stamens inserted in the lowest third of the corolla tube.....
12. *yunnanensis.*

Stamens inserted in the upper two-thirds of the corolla tube :

*Corolla densely glandular, not tomentose on the exterior :

Limb of the corolla about 6 mm. in diameter ; tube about 7 mm. long, anthers inserted in the middle ; leaves subtruncate at the base :

Inflorescence on the previous year's wood appearing before the leaves.....52. *tibetica* var. *glandulifera.*

Inflorescence terminal on the leafy branches :

Leaves 2–3 cm. long, cuneate at the base ; inflorescence small..... 13. *acosma.*

Leaves 6–8 cm. long, cordate at the base, inflorescence large.....38. *agathosma* var. *glandulifera.*

Limb of the corolla about 2 mm. in diameter ; tube about 3 mm. long ; anthers inserted near the mouth ; leaves attenuate at the base.....14. *adenantha.*

*Corolla eglandular glabrescent or tomentose on the exterior, occasionally with a few glands among the tomentum :

STAMENS INSERTED AT OR IMMEDIATELY BELOW THE MOUTH OF THE COROLLA :

Flowers very large ; corolla tube 6–8 mm. in diameter at the mouth..... 15. *Colvilei.*

Flowers much smaller ; corolla tube not exceeding 3·5 mm. in diameter at the mouth :

Length of corolla tube twice the diameter at the mouth (i.e. about 6 mm. long, 3–3·5 mm. diam.) :

Branchlets tetragonous ; ovary either glabrescent or tomentose throughout.....16. *Forrestii.*

Branchlets terete ; upper half of ovary tomentose, lower half glabrous .....17. *taliensis.*

Length of corolla tube more than three times the diameter at the mouth (i.e. not exceeding 2·5 mm. in diam.):

Ovary glabrous :

Branchlets subterete ; flowers not exceeding 5 mm. in length..... 18. *albiflora.*

Branchlets tetragonous :

Corolla not exceeding 5 mm. long, 1 mm. wide..... 19. *Duclouxii.*

Corolla 8–10 mm. long, 2 mm. wide.....20. *longifolia.*

Ovary tomentose :

Inflorescence a widespreading panicle :

Leaves lanceolate ; anthers distinctly showing in the mouth of the corolla tube (Asiatic).....21. *paniculata.*

Leaves ovate or hastate-lobed ; anthers scarcely showing in the mouth of the corolla tube (African)..... 22. *pulchella.*

Inflorescence an elongated spikelike panicle :

†Rhachis, peduncles, etc., clothed with a dense white floccose tomentum :

Leaves petiolate, submembranous, up to 10 cm. wide ; stem more or less terete.....23. *nivea.*

Leaves sessile, coriaceous, not exceeding 5 cm. wide ; stem tetragonous..... 24. *cylindrostachya.*

†Rhachis, peduncles, etc. clothed with a short sparse tomentum, never floccose and frequently becoming glabrescent :
Flowers 8–10 mm. long :
Exterior of corolla tube densely tomentose :
Inflorescence very dense ; branchlets tetragonous, winged ; calyx longer than diameter..... 25. *macrostachya.*
Inflorescence very lax ; branchlets subterete, calyx shorter than diameter.....26. *Hookeri.*
Exterior of corolla tube glabrous..... 27. *Henryi.*
Flowers 4–6 mm. long :
Corolla scarcely twice as long as calyx ; branchlets winged..... 28. *alata.*
Corolla three to five times as long as calyx ; branchlets not winged :
Stipules auriculate, almost always present ; stem terete ; flower reddish-yellow, exterior of corolla with glands interspersed with sparse tomentum ; calyx very densely tomentose.....29. *polystachya.*
Stipules absent (reduced to stipular ring) ; stem tetragonous ; flower lead-blue, throat orange, exterior of corolla eglandular, densely tomentose ; calyx rather sparsely tomentose.....30. *Griffithii.*

STAMENS INSERTED IN THE MIDDLE PORTION OF THE COROLLA TUBE :
Ovary glabrous :
Corolla tube 3·0–3·5 mm. in diameter, leaf margin serrate :
Style 3–4 mm. long.....31. *limitanea.*
Style 1 mm. long.....32. *Cooperi.*
Corolla tube 1–1·5 mm. in diameter :
Flowers subsessile ; corolla tube not exceeding 5 mm. in length, exterior villous or tomentose :
Corolla tube 2–2·5 mm. long, less than 1 mm. wide ; lobes erect..... 33. *asiatica.*
Corolla tube 4·5–5 mm. long, 1·5 mm. wide, lobes widespreading .....34. *Neemda.*
Flowers distinctly pedunculate ; corolla tube 7–10 mm. in length, exterior usually glabrous :
Lamina more than twice as long as broad ; margin serrate ; inflorescence elongate ; ripe fruit c. 10 mm. long..... 35. *Davidii.*
Lamina less than twice as long as broad ; inflorescence short ; ripe fruit c. 5 cm. long..... 36. *Delavayi.*
Ovary tomentose :
Calyx $\frac{2}{3}$–$\frac{3}{4}$ length of corolla tube ; flowers large, very densely clustered in large subglobose whorls.....37. *hastata.*
Calyx usually less than $\frac{1}{2}$ length of corolla tube ; flowers not very densely clustered :

**Inflorescence terminal on the leafy branches :
Inflorescence interrupted pseudo-verticillate ; leaves dentate, densely tomentose on both surfaces, cordate-ovate, attenuate to a fine acumen and long-petiolate..... 38. *agathosma.*
Inflorescence not interrupted nor apparently verticillate :
Panicle widespreading or few-flowered :
Upper surface of lamina densely bullate and stellate-tomentose ; leaf usually distinctly auriculate with a short petiole (African).....39. *salviifolia.*
Upper surface of lamina not bullate ; leaf not auriculate at the base (Asiatic except *auriculata*) :
Leaves long-petiolate, more or less truncate or cordate at the base, usually crenate-serrate, up to 18 cm. long :
Inflorescence compound, spreading, ebracteate or with a few short bracts.....40. *crispa.*
Inflorescence small with numerous bracts longer than the flowers.....41. *caryopteridifolia*
Leaves attenuate at the base into a short petiole, or subsessile, lanceolate, entire :
Shrubs of dwarf habit with leaves less than 4 cm. long, 1 cm. wide and few-flowered inflorescence:
Calyx densely tomentose, length scarcely equalling its diameter ; lobes very short and broad, subobtuse.....42. *brachystachya.*
Calyx tomentellous, length about 1½ times its diameter ; lobes triangular acute...43. *nana.*
Shrubs of tall habit with large leaves (6–20 cm. long) and many-flowered inflorescence :
Upper surface of the leaf glabrous (African)..... 44. *auriculata.*
Upper surface of the leaf covered with stellate hairs (Asiatic) :
††Panicle subcylindrical c. 5 cm. in diameter on short leafy branches ; leaves broadly elliptical or elliptic-ovate ; peduncles 1–2 cm. long..... 45. *heliophila.*
††Panicle more or less pyramidal, usually widespreading on long leafy shoots :
Corolla tube c. 4 times as long as wide ; leaves rarely exceeding 11 cm. in length.... 46. *officinalis.*
Corolla tube c. 8 times as long as wide ; leaves up to 20 cm. long.....47. *acutifolia.*
Panicle strict, elongate, spike-like, bearing many flowers :
Branches tetragonous, plant sparsely tomentose, with auriculate stipules.....48. *myriantha.*

Branches terete ; plant very densely tomentose :
Flowers very densely crowded in erect spikelike panicles, auriculate stipules sometimes present.... 49. *Fallowiana.*
Flowers rather lax in very long arcuate spikes ; stipules absent :
Leaves subcoriaceous with the upper surface markedly rugose, narrowly lanceolate abruptly petiolate ; petioles 1–1·5 cm. long...50. *candida*
Leaves membranous with the upper surface smooth, broadly lanceolate, attenuate into the very short petiole.....51. *stenostachya.*
**Inflorescence borne on short shoots on the previous year's wood, appearing before the leaves.....52. *tibetica.*

§ Gynandrae.

1. **Buddleja gynandra** *Marquand*, sp. nov. ; distinctissima staminibus ovario nec corollae affixis.

Shrub. Branches subterete, rather slender, covered with a short tomentum when young. *Leaves* opposite, lanceolate or ovate-lanceolate, acuminate, up to 13 cm. long, 3·5 cm. wide, attenuate into a petiole 5–8 mm. in length ; both upper and lower surface of the lamina densely stellate-tomentose at first, afterwards becoming glabrous or sparsely tomentellous above ; margin entire, occasionally slightly sinuate. *Stipules* reduced to a stipular ring. *Inflorescence* a rather lax widespreading panicle. *Bracts* linear, 6–8 mm. long above, lower ones larger and resembling the leaves. *Flowers* yellowish-white, scented, forming cymules of 5–7 flowers on short tomentose peduncles. *Calyx* tomentose, 2–2·5 mm. long, divided to $\frac{1}{3}$ into 4 subobtuse deltoid lobes. *Corolla* sparsely stellate-tomentose outside ; tube 4–5 mm. long, about 1 mm. in diameter, sparsely pubescent inside ; lobes 4, obovate-spathulate, about 2 mm. long, 1·5 mm. wide, entire. *Stamens* 4, inserted on the side of the ovary, about 1·5 mm. long ; anthers subdeltoid ; lower portion of filaments adnate, upper free portion slender, slightly shorter than the anthers. *Ovary* tomentose ; style twice as long as the stamens ; stigma clavate. *Fruit* not seen.

Tonkin. Langson, in rocky places, 27 Jan. 1886, *B. Balansa* 930 (type in Herb. Kew.).

§ Alternifoliae.

2. **B. amentacea** *Kränzlin* in Bull. Jard. Bot. Pétersb. xiii. 89, 92 (1913).

Java. Precise locality and collector unknown, "*Herb. Fischer.*"

The only known specimen of this species is the "type," which is preserved in the Herbarium of the Principal Botanic Garden, Leningrad. Unfortunately the lower leaves are not present, and the collector's label is indecipherable. This was stated to be the case

by the author of the species in the original place of publication and by the editor in a footnote in the Russian text. A recent study of the type sheet has failed to reveal any clue. The label also bears the *nomen nudum* " Buddleya microcarpa Kl." in another handwriting.

3. **B. alternifolia** *Maxim.* in Bull. Acad. Pétersb. xxvi. 494 (1880).

" China Borealis Vallis fl. Peishui inter pagos Tangtshang et Lidshapu, prov. Tschili, Schansi, Kansu occidentali et orientali et Szetschuan septentrionali " (apparently Tangshan and Likiapu in Southern Kansu), 19 Juni 1885, *G. N. Potanin.*

Kansu. Near Pinglo, Oct. 7, 1914, *F. N. Meyer* 1787 ; Tsing shui hsien, 1500 m., July 7, 1922, *J. Hers* 2402 ; moist foothills, Ho lan shan mountains, 1375–2400 m., shrub up to 5 m., flowers violet, very fragrant, May 10-25, 1923, *R. C. Ching* 185.

Cultivated specimens of *Purdom* 388 and *Farrer* 100, also belong to this species.

4. **B. Legendrei** *Gagnepain* in Lecomte, Not. Syst. ii. 280 (1912).

Kansu. Pongsu shi in the Li-kiu Valley, on mica schist soil, 3400 m., *Legendre* 1036.

5. **B. tsetangensis** *Marquand* in Journ. Linn. Soc., Bot. xlviii. 202 (1929).

Tibet. Tsetang, Tsampo Valley, on cliffs and gravel beds abundant in most villages, 3600 m., April 21, 1924, *F. Kingdon Ward* 5616.

6. **B. Wardii** *Marquand* in Journ. Linn. Soc., Bot. xlviii. 203 (1929).

Tibet. On rocks and cliffs by the river and around villages in the Tsang-po Valley below Tsetang, 3000–3400 m., April 29, 1924, *F. Kingdon Ward* 5636.

§ Curviflorae.

7. **B. Lindleyana** *Fortune* in Lindl. Bot. Reg., Misc. 25 (1844).— *B. intermedia* Carr. in Rev. Hort. xlv. 151 (1873). *B. insignis* Hort. ex Dippel, Handb. Laubholzk. i. 154 (1889). *B. salicifolia* Hort. ex Dippel loc. cit. 153.

Szechuan. Yangtze banks, without precise locality, shrub of 60 cm. with purple flowers, June 1903, *E. H. Wilson* (Veitch Exped.) 4116 ; near Wa-shan, valley of Tung River, 1000–1300 m., July and Nov. 1908, *E. H. Wilson* (Arn. Arb. Exped.) 1375a.

Hupeh. Ichang and immediate neighbourhood, *A. Henry* 4190 ; in glens, Ichang, flowers red, Aug. 1901, *E. H. Wilson* (Veitch Exped.) 1615.

Chekiang. Chusan, *Fortune* 37 ; near Ningpo, Sept. 7, 1877, *W. Hancock* 26 ; without precise locality, *W. Hancock* 87 ; near Hangchow, July 3, 1915, *F. N. Meyer* 1497 ; open roadside, Ling-Ying-Sze near Hangchow, June 20, 1922, *A. N. Steward* in *Nanking Univ. Herb.* 2354.

Fukien. "Almost all from about 2000 feet above the plain," Foochow, 1897, *W. R. Carles* 575; open ground, Pei-ling hills, Foochow, *W. R. Price* 1172; Foochow city, Wooshihshan, on rocks by the side of spring, shrub with purple flowers, Aug. 25, 1923, *H. H. Chung* 2359.

Kiangsi. Kiukiang, 1873, *Shearer*; Lu shan (Kuling Range), 200–1100 m., July, Aug., Sept. 1908, *A. K. Schindler* 363.

Kwangtung. Hillsides by the North River, July 1864 and June 1865, *T. Sampson* in *Herb. Hance* 321; Nin District, Sept. 20, 1918, *Canton Christian College Herb.* 3445.

Hongkong. South of Wanchai Gab, one bush only, Oct. 15, 1900, *W. T. Tutcher* 656.

Japan. Nikko and Fujiyama, *Maries*.

var. **sinuato-dentata** *Hemsl.* in Journ. Linn. Soc., Bot. xxvi. 120 (1889).

Hupeh. Ichang and immediate neighbourhood, flowers purple, *A. Henry* 624 and 3974; without precise locality, June 1901, *E. H. Wilson* (Veitch Exped.) 1995.

Szechuan. Mount Omei, 750 m., *E. Faber* 77; Mount Omei, bush of 1·3 m., July 1904, *E. H. Wilson* (Veitch Exped.) 5037; Yachou-Fu, thickets, 600–1300 m., bush of 1–1·5 m., flowers very dark red, July and Nov. 1908, *E. H. Wilson* (Arn. Arb. Exped.) 1375.

Differing from the type in the leaves being sinuate-dentate.

8. **B. japonica** *Hemsl.* in Journ. Linn. Soc., Bot. xxvi. 119 (1889), in obs.

Japan. Hondo: Hakone, Yokohama, 1862, *Maximowicz*; central part of the island, 1866, *Tschonoski*; without precise locality, *F. V. Dickens* 1305; Oyama, Oct. 1876, *J. Bisset*; central mountains, 600–2100 m., *Maries*; without precise locality, Aug. 1904, *H. Takeda*; without precise locality, Sept. 28, 1914, *E. H. Wilson* 7585. Japan, without precise locality, 1866-74, *L. Savatier* 896; Fudintsugi, Aug. 13, 1889, *Sci. Coll. Imp. Univ. Jap.*; Hyachine, Aug. 23, 1894, *Faurie* 13519.

9. **B. curviflora** *Hook. et Arn.* Bot. Beech. Voy. 267 (1836-1840). —*B. carnea* Carr. in Rev. Hort. li. 90 (1879).

Luchu Archipelago. Without precise locality, June 1827, *Beechey*.

10. **B. venenifera** *Makino* in Bot. Mag. Tokyo, xxiv. 56 (1910).

Japan. Osumi Province: Miyanoura, Yaku-shima Island, Sept. 1909, *T. Makino*; Nako-no-shima Island, *S. Tashiro*.

A specimen in Herb. Kew. received through the Paris Herbarium from the Japanese Exhibition of 1886 without any particulars appears to belong to this. The corolla is densely glandular and sparsely stellate-tomentose outside.

Professor Hayata has very kindly presented to Kew some leaves and portions of stems of this plant collected by Dr. Makino, judging from which it appears to be a distinct species. As, however, I have not been able to see the flowers, its exact position is doubtful and it is placed in the Key to the species from the original description.

11. **B. Purdomii** *W. W. Smith* in Notes Roy. Bot. Gard. Edin. ix. 87 (1916).

KANSU. Common on very steep and torrid cliffs and banks of the most torrid loess region about Kiai-how; descending along the burning walls of the Hei-Shui-Jang, but not extending to Siku, April 29, 1914, *R. Farrer* 14.

§ RECTIFLORAE.

12. **B. yunnanensis** *Gagnepain* in Lecomte, Not. Syst. ii. 187, 192 (1912).

YUNNAN. Between Szemao and Chienhung, *Bons d'Anty* 437; Szemao in hedgerows, 1300 m., a shrub of 60 cm. with lilac flowers, *A. Henry* 12214.

13. **Buddleja acosma** *Marquand*, nom. nov.*—*B. incompta* W. W. Smith in Notes Roy. Bot. Gard. Edin. viii. 180 (1914), non Linn. fil.

YUNNAN. On dry rocks and exposed hillsides in the A-tun-tsi Valley, 3400 m., an untidy bush of 1–2 m., leaves silver in spring, golden in autumn, June 1913, *F. Kingdon Ward* 345; on calcareous and schistose soil, frequent west of Likiang, 1900–1950 m., May 30, 1916, *H. Handel-Mazzetti* 8786; open dry situations in side valleys of the Mekong-Salween divide, lat. 28° N., 2300–2700 m., flowers soft grey rose, fragrant, June 1918, *G. Forrest* 16557; dry situations amongst boulders and scrub on the Doker-La, Mekong-Salween divide, lat. 28° 25′ N., 2700 m., a stunted shrub of 60 cm. with rose-lavender flowers, June 1919, *G. Forrest* 18720; on cliffs and dry rocky slopes on the Mekong-Salween divide, lat. 27° 36′ N., long. 98° 50′ E., 2700 m., shrub of 60 cm., in fruit, July 1921, *G. Forrest* 19665; open, dry, rocky hillsides in the A-tun-tsi Valley, lat. 28° 30′ N., long. 98° 54′ E., 3000 m., shrub of 60–90 cm., in fruit, Sept., 1921, *G. Forrest* 20767.

14. **B. adenantha** *Diels* in Notes Roy. Bot. Gard. Edin. v. 248 (1912).

YUNNAN. Amongst scrub on the margins of pine forests on the eastern flank of the Tali Range, lat. 25° 40′ N., 2900–3400 m., a shrub of 1·5–2·5 m. with fragrant greyish-purple flowers, June-Aug. 1906, *G. Forrest* 4736.

15. **B. Colvilei** *Hook. f. et Thoms.* in Hook. Illustr. Himal. Pl. t. 18 (1855).

NEPAL. Nangki (near the border of Sikkim), shrub of 3 m., *Hooker*.

* I have been obliged to change the name of this species, for the trivial name was already occupied by the South African *B. incompta* Linn. fil. Suppl. 123 (1781). C.V.B.M.

Sikkim. Lachen, 2800–3600 m., July and Aug. 2, 1849, *Hooker*; Chola, 3000–4200 m., Nov. 5 and 6, 1849, *Hooker*; Tonglo, 3000 m., Aug. 5, 1874, *Treutler* 493; Tonglo, 3100 m., Nov. 3, 1874, *J. S. Gamble* 3256a; Tonglo, 3000 m., Sept. 1880, July 1881, and July 1882, *J. S. Gamble* 8466, 9495, and 10436; Islumbo, 3400 m., Oct. 24, 1875, *J. S. Gamble* 25599; Tumbok, 3000 m., tree of 6 m., Oct. 10, 1870, *C. B. Clarke* 12896a.

Tibet. Chumbi: Pun-ka-bee-see-mo, July 24, 1884, *Dr. King's collector* 32.

The fruits in this species vary considerably in length.

16. **B. Forrestii** *Diels* in Notes Roy. Bot. Gard. Edin. v. 249 (1912).

Yunnan. On ledges of cliffs and very stony ground on the western slopes of the Tsan-shan Range near the head of the Yangtze Valley, lat. 25° 40′ N., 2800–3000 m., flowers reddish-maroon, fragrant, Sept. 1905, *G. Forrest* 979; open situations in scrub on the hills east of Tengyueh, lat. 25° N., 2300–2600 m., shrub of 2–4 m., flowers pale mauve, almost white, fragrant, Dec. 1912, *G. Forrest* 9471; on the mountains between the Salween and Irrawaddi, 1800 m., Oct. 1914, *C. Schneider* 2591; 1917-1919 collection, without precise data, *G. Forrest* 16017; in thickets in side valleys, Jang-tzow Shan, Shweli-Salween divide, lat. 25° 10′ N., 2600 m., shrub of 3–4 m. with fragrant soft lavender-rose flowers, Aug. 1919, *G. Forrest* 18361.

There is a wide range of variation in the indumentum of the ovary in this species. Even in the same inflorescence of the type specimen, of two flowers examined, one had a practically glabrous ovary while the other was tomentose.

17. **B. taliensis** *W. W. Smith* in Notes Roy. Bot. Gard. Edin. ix. 87 (1916).

Yunnan. Open scrub on the western flank of the Tali Range, lat. 25° 40′ N., 2900 m., Aug. 1913, *G. Forrest* 11561.

18. **B. albiflora** *Hemsl.* in Journ. Linn. Soc., Bot. xxvi. 118 (1889).—*B. Hemsleyana* Koehne in Gartenfl. 169 (1903).

Hupeh. Patung district, *A. Henry* 156a, 1871, 2515 and 4689; Kuei, spreading shrub of 1 m. with purplish flowers, *A. Henry* 6193; west of the province, without precise locality, flowers lilac, July 1901, *E. H. Wilson* (Veitch. Exped.) 2247 and 2247a, also July 1907 (Arn. Arb. Exped.) 3360 and 3361.

Shensi. Central part of the province, Aug. 20, 1916, *E. Licent* 2673.

var. **Giraldii** *Rehd. & Wils.* in Sargent Pl. Wilson. i. 569 (1913).—*B. Giraldii* Diels in Engl. Jahrb. xxix. 535 (1900).

Shensi. Ta-see-tsuen, Sept. 19, 1897, *Giraldi*; Kay-y-san, June 18, 1899, *Giraldi* 5497 and 5498; Tai-pei-shan, 1910, *W. Purdom*.

Szechuan. Without precise locality, shrub of 2 m. with lilac flowers, 1300 m., Aug. 1903, *E. H. Wilson* (Veitch Exped.) 4117.

Differing from the type in the tomentose calyx.

19. **Buddleja Duclouxii** *Marquand*, sp. nov. ; affinis *B. albiflorae* Hemsl., sed ramulis gracillimis tetragonis inflorescentia angustissima inter alia insigniter differt.

Shrub. Branches slender, tetragonous, sparsely tomentose. *Leaves* thin, opposite, (lower not seen) upper lanceolate, up to 5 cm. long, 1·3 cm. wide, cuneate at the base, margin finely serrate-dentate, upper surface at first sparsely stellate-tomentose, shortly becoming glabrescent, dark green in the dried specimen, lower surface densely tomentose with the nerves inconspicuous. *Stipules* small, auriculate. *Inflorescence* terminal, composed of 1–3 strict panicles up to 25 cm. long, 1–1·5 cm. wide, cymules subsessile, 2–3-flowered. *Bracts* few, linear-lanceolate, up to 8 mm. in length. *Flowers* small (colour not known) ; pedicels 1–1·5 mm. long, tomentose. *Calyx* tomentose, 2–2·5 mm. long, lobes 4, narrow, acute, shorter than the tube. *Corolla* sparsely tomentose outside ; tube 4–5 mm. long, 1 mm. in diameter, interior pubescent ; lobes 4, obovate-spathulate, 1–1·5 mm. long, margin slightly erose. *Anthers* subsessile, 1 mm. long, inserted just below the mouth of the corolla-tube. *Ovary* glabrous, subglobose ; style short, glabrous ; stigma clavate, 1–1·5 mm. in length. *Fruit* not seen.

Yunnan. Neighbourhood of Ngy-leang, Sept. 14, 1905, (collected by Petrus Py), *Ducloux* 3790.

20. **B. longifolia** *Gagnepain* in Lecomte, Not. Syst. ii. 190, 191 (1912).

N.E. Upper Burma. Shrub of 1·5–2 m., flowers rose, tube yellow, on margins of thickets and by streams on Hpimaw-pass, N'Maikha-Salween Divide, lat. 26° N., long. 98° 42′ E., 3000 m., Sept. 1924, *G. Forrest* 25079.

Yunnan. Woods, Kichan, near Ta-pin-tze, flowers violet, 2800 m., Aug. 21, 1889, *Delavay* 3991 ; shrub of 2–4 m., flowers fragrant, deep lavender-purple, interior darkest, in thickets by streams in side valleys on the Chien-chuan–Mekong divide, lat. 26° 30′ N., long. 99° 40′ E., 2700 m., Aug. 1922, *G. Forrest* 23215.

21. **B. paniculata** *Wall.* in Roxb. Fl. Ind. ed. Carey, i. 412 (1820) ; Wall. Cat. No. 6403.

Nepal. *Wallich* 6403.

Assam. Manipur : " collected during the Government Demarcation Survey of 1881-82 " (without precise locality), *G. Watt* 6061. Lushai Hills : Stalong, 1500 m., " a *Buddleja* with bunches of small flowers, magenta pink within the tube," Feb. 1929, (*Mrs.*) *N. E. Parry* 125.

The two species, *B. paniculata* and *B. crispa* (No. 40), are united in Fl. Brit. Ind. by C. B. Clarke (1883), and by all subsequent authors.

In addition to the shape of the leaves and habit of the inflorescence they may be distinguished by the position of the anthers in the corolla tube.

B. nepalensis Colla which has been cited as a synonym of *B. paniculata* (sensu lato) is a doubtful species. The description agrees neither with *B. paniculata* (sensu stricto) nor with *B. crispa*.

22. **B. pulchella** *N. E. Br.* in Kew Bull. 1894, 389.—*B. usambarensis* Gilg in Engl. Pfl. Ost-Afr. C. 313 (1895). *B. Woodii* Gilg in Engl. Jahrb. xxiii. 201 (1896).

Tanganyika. Usambara: Kwa Mshaza, in high forest, 1570 m., *Holst* 8967.

Natal. Near Kettle Fountain, 1862, *T. Cooper* 1159; Inanda, comm., Oct. 20, 1879, *J. M. Wood* 574; Alexandra District, Dumisa, 550 m., June 19, 1910, *H. Rudatis* 1035, and 650 m., July 3, 1910, *H. Rudatis* 1054. Specimens cultivated at Kew and in the Botanic Gardens, Durban, origin York, 600–1000 m., comm. *J. M. Wood*. Kentani District, 400 m. July 1913, *Alice Pegler* 764.

23. **B. nivea** *Duthie* in Gard. Chron. Ser. 3, xxxviii. 275 (1905).

W. Szechuan. Mountains, Washan, 1800-2400 m., flowers purple, shrub of 1·5–2 m., July 1903, *E. H. Wilson* (Veitch Exped.) 4121; south-east of Tachienlu, Tung Valley, 1300-2000 m., Aug. 1908, bush, 1–1·5 m. high with lilac flowers, *E. H. Wilson* (Arn. Arb. Exped.) 3356; Washan, thickets 1300–2000 m., bush, 1·5–2·5 m. high with purple flowers, Aug. 1908, *E. H. Wilson* (Arn. Arb. Exped.) 3358.

Locality unknown, *Hort. Veitch*, flowers Aug. 4, 1905, fruit Oct. 14, 1905, *E. H. Wilson* (Veitch Exped.), *Seed No.* 1428 (type specimens).

var. **yunnanensis** *Rehder & Wils.* in Sargent Pl. Wilson. i. 570 (1913).—*B. macrostachya* Benth. var. *yunnanensis* Dop in Bull. Soc. Bot. France lvii. Mém. xix. 7 (1910).

W. Szechuan. Without precise locality, mountains, 2500 m., flowers purple, bush 1–2 m. high, July 1903, *E. H. Wilson* (Veitch Exped.) 4119; West of and near Wen-chu'an Hsien, in the Min Valley, in roadside thickets, 1300–1600 m., May 25, 1908, *E. H. Wilson* (Arn. Arb. Exped.) 3353, Aug. 1908, 3359; vicinity of Tachienlu in thickets, 1300–3800 m., July and Aug. 1908, *E. H. Wilson* (Arn. Arb. Exped.) 3351, 3357; Mupin, in thickets, 1600–2000 m., July and Oct. 1908, *E. H. Wilson* (Arn. Arb. Exped.) 1351, 1351a, 3354.

Differs from the type in the spikes being usually solitary and the upper surface of the leaf pubescent.

24. **B. cylindrostachya** *Kränzlin* in Engl. Jahrb. l. Beibl. 111, 35 (1913).

Yunnan. Mengtze, in deep valleys, very rare shrub with dark purple flowers smelling of rhubarb root, Jan. 25, 1895,

W. Hancock 264 ; Mengtze, on grassy mountains near Ho-chie-ch'ai, 1600–1800 m., corolla reddish with orange throat, Nov. 15, 1896, *A. Henry* 10251 ; 2nd sheet of same No., bushy shrub 1 m. high with lilac flowers ; Fêng chên Liu, 1500 m., shrub of 1–2 m., with pink to purplish flowers, Feb. 3, 1897, *A. Henry* 10251a ; Szemao, grassy places on summit of East high range (Men chu thian), local shrub 15–30 cm. high with lilac flowers, 1800 m., Nov. 27, 1896, *A. Henry* 10251b ; on way to Hsin-Kei, Fêng chên Liu, Mengtze, shrub of 3 m. with small leaves, 1500 m., *A. Henry* 10251d.

25. **B. macrostachya** *Benth.* Scroph. Ind. 42 (1835).—*B. Martii* J. A. Schmidt in Journ. Bot. vi. 228, 245 (1868).

Assam. Sillet, 1837, *Wallich* 6407 : Khasia ; *Fielding* sine numero ; *Griffith* 196 and 197, also *East Ind. Co. Herb.* 3742 ; Sururein, lax bush of 4 m., June 26, 1850, *Hooker* : Kullung, July 8, 1850, *Hooker* ; Pourang, large bush, "flowers sweet, flesh-coloured with darker eye," Sept. 15, 1850, *Hooker* ; Myrong, 1200–1800 m., flowers pale primrose with crocaceous eye, odour strong, Oct. 1850, *Hooker* : Naga Hills ; Kohima, Oct. 1886, *D. Prain* ; lower spur of Japro Kohima, large straggling shrub on the exposed crest of knife edge ridge, flowers in long pendent spikes, cream with deep orange eye, strongly fragrant, 2100 m., lat. 25° 40′ N., long. 94° 10′ E., Nov. 27, 1929, *F. Kingdon Ward* 7702 : Lushai Hills ; Chuarlung 1500 m., flowers mauve with red centres, Jan. 1928, (*Mrs.*) *N. E. Parry* 124, 466 and 553 ; Manipur, "comm. 1886," *Watt* 5011 and 5125.

Burma. Bhamo district ; Lahpyekha, 1800 m., small tree, almost shrub, flowers mauve, stem brownish, upper bark peels off in strips, March 18, 1927, *Saw Mamg Mya* 5321 ; 1800 m., shrub, flowers dull mauve, stem greyish red, slightly crooked, Bum Rawng Bum, March 20, 1927, *Saw Mamg Mya* 5332. Mogok District, Kyinitaung Valley, 1200 m., Nov. 23, 1928, *E. A. Seaton* 7421.

Yunnan. West Mountains, Szemao, 1500 m., tree of 6 m., *A. Henry* 10251 c ; in side valleys on the hills east of Tengyueh, lat. 25° N., 1800 m., shrub of 2·5–3·5 m., in fruit, May 1912, *G. Forrest* 7604 ; shrub of 6 m., open situations, hills around Man-Hsien, lat. 24° 30′ N., 900-1200 m., flowers dull rose fragrant, Feb. 1913, *G. Forrest* 9661 ; in thickets by streams on the Chien-chuan—Mekong divide, lat. 26° 36′ N., long. 99° 40′ E., 2400-2700 m., shrub of 3–6 m., flowers deep purple lavender, tube darkest, fragrant, July 1922, *G. Forrest* 23055.

Siam. Calcareous rocks on "summit III," 2180 m., shrub of 2·5 m., Doi Chieng Dao, Feb. 17, 1905, *C. C. Hosseus* 400.

26. **Buddleja Hookeri** *Marquand*, sp. nov. ; affinis *B. macrostachyae* Benth. sed ramulis subteretibus inflorescentia laxa calyce breviore inter alia differt.

Shrub 4–6 m. high. *Branches* subterete, drooping, at first whitish tomentose, shortly becoming glabrescent. *Leaves* opposite, lanceolate or obovate-lanceolate, subsessile, attenuate at the base, 15–20 cm.

long, 5–7 cm. wide, margin finely serrate, apex acuminate, upper surface soon becoming glabrous, lower surface tomentose. *Stipules* reduced to a rather conspicuous ring. *Inflorescence* terminal, of few lax tomentose spike-like panicles, usually bearing a pair of leaves at the basal node, and axillary. *Bracts* few, linear, up to 8 mm. long. *Peduncles* usually very short. *Pedicels* 2 mm. long, tomentose. *Calyx* tomentose; tube campanulate 1·5 mm. long, 2·5 mm. in diameter; lobes 4 acute, scarcely 1 mm. long, sinus broad, rounded. *Corolla* throat deep orange, limb white, powerfully fragrant, exterior tomentose throughout; tube 8–10 mm. long, 2–2·5 mm. in diameter, interior pubescent except near the base; lobes 4 obovate or suborbicular c. 3 mm. long and wide, margin subentire. *Stamens* 4 inserted just below the mouth of the corolla, anthers scarcely 1·5 mm. long, subsessile. *Ovary* densely tomentose; style tomentose at the base, together with the clavate stigma up to 5 mm. in length. *Fruit* ovoid, up to 8 mm. long. *Seeds* tailed, about 2·5 mm. long.

Frontier of Burma and Tibet. In open Alder glades in the bottom of the valley of the Seinghku, lat. 28° 5′ N., long. 97° 30′ E., 2400 m., Sept. 25, 1926, *F. Kingdon Ward* 7456 (type).

Sikkim. Lachen, 1800 m., Aug. 5, 1849, *J. D. Hooker*; Lachong River, 1800 m., Oct. 2, 1849, *J. D. Hooker*; Choongtau hill, Oct. 28, 1849, *J. D. Hooker*; Chongthang, Sept. 1903, *Prain*.

27. **B. Henryi** *Rehder & Wilson* in Sargent Pl. Wilson. i. 571 (May 1913); Kränzlin in Engl. Jahrb. l. Beibl. 111. 44 (August 1913), pro parte.*

Yunnan. Mengtze, S.E. in woods, 1500 m., shrub 2·5 to tree of 6 m., flowers flesh-coloured, *A. Henry* 9025; ravine, Mengtze, 1500 m., orange flowers, deliciously fragrant, *A. Henry* 9025b; open situations amongst scrub on the western flank of the Shweli-Salween divide, lat. 25° 20′ N., 2400–2700 m., shrub 4–6 m., in fruit, Aug. 1912, *G. Forrest* 9044; in thickets and in conifer forests, Salween-Kiu-chang divide, lat. 27° N., long. 98° 35′ E., 3000 m., shrub 2·5–3 m., flowers fragrant deep muddy wine colour, Aug. 1924, *G. Forrest* 25761.

var. **glabrescens** *Marquand*, var nov.; a typo differt ovario glabrescente.—*B. Henryi* Kränzl. in Engl. Jahrb. l. Beibl. 111. 44 (1913) *pro parte*.

Yunnan. Flowers reddish, south of Red River from Manner, 1800 m., *A. Henry* 9025a.

Differs from the type in the glabrescent ovary.

var. **Hancockii** *Marquand.—B. Hancockii* Kränzlin in Engl. Jahrb. l. Beibl. 111. 46: 1913.

* The *B. Henryi* Kränzl. was founded upon a mixed type; the "ovarium glabrum" agreeing with Henry 9025a only, of the three sheets cited and marked "typus" by the author. The other two had already been cited by Rehder & Wilson under their description published a few months previously.

YUNNAN. Mountain woods near Mengtze 1800–2100 m., a small tree or shrub, flowers dull purple with rather oppressive odour, Aug. 18, 1895, *W. Hancock* 384.

Differs from the type of the species and the preceding variety in the exterior of the corolla being tomentose.

28. **B. alata** *Rehder & Wilson* in Sargent Pl. Wilson. i. 570 (1913).

W. SZECHUAN. Ravine 1200 m. (without precise locality), Aug. 1903, shrub of 2 m., flowers lilac, *E. H. Wilson* (Veitch Exped.) 4118.

This species is closely allied to *B. myriantha* Diels, from which it differs in the absence of auriculate stipules, more distinctly winged stem, coarser tomentum on the flowers, and larger leaves, as well as the more or less infundibular corolla showing the anthers in the mouth.

29. **B. polystachya** *Fresen.* in Flora xxi. 605 (1838). – *B. acuminata* R. Brown *nomen* in Salt. It. Abyss. App. 62 (1814), non Poir. *B. Saltiana* Steud. Nom. ed. 2, i. 235 (1840). *B. foliata* R. Br. ex Benth. in DC. Prodr. x. 466. *B. Poaelii* Kränzl. in Engl. Jahrb. l. Beibl. 111, 34 (1913).

ARABIA. Yemen; on Kahil mountain near Menâkhah, 2500 m., Feb. 18, 1889, *G. Schweinfurth* 1467.

ERITREA. Neighbourhood of Acrur, 1900 m., March 6, 1892, *G. Schweinfurth & D. Riva* 779.

ABYSSINIA. Tigre; near Adowa, *Schimper* 1905; *Steudner* 851; Ankober, shrub of 2·5–3 m., common on the fences, called "Amfar," Nov. 12, 1841, *Roth* 464; Memsach, in narrow valleys near Gennia, June 26, 1837, *Schimper* 266; Gondar and vicinity, *R. E. Massey* 72; Mount Chillalo, 2400–2800 m., Nov. 1926, *H. Scott.*

UGANDA. Mount Nkoko Njern, 1500 m., shrub of 2–3 m. with reddish brown flowers, in short grassland, Nov. 12, 1916, *J. D. Snowden* 495; Mount Elgon, 1500–2000 m., shrub or small tree 3–5 m. high with reddish brown flowers, fairly common in bush and forest land, Feb. 17, 1924, *J. D. Snowden* 824; and without precise locality, *H. Powell* 73; Mount Elgon, 2400 m., shrub of 3 m. with yellow cinnabar flowers, occasional on the edge of the Bamboo zone, Jan. 1918, *R. A. Dümmer* 3610.

KENYA. Nyanza Prov.: Usain Gishu Plateau and Trans Nzoia, Nov.-Dec. 1928, *W. J. Dawson* 652. Naivasha Prov.: Nakuru, among the rocks of a dry valley, 1800 m., bushy shrub of 2 m., Dec. 1893, *G. F. Scott Elliott* 6850; Aberdare Mountains, 1905, *Evan James*; Kijube, shrub at 2200 m., Feb. 23, 1914, *W. J. Dawson* 24; Kamasia, 2400 m., "small tree up to 5 m.," *E. Battiscombe* 1189; near Forest Station, Dec. 20, 1921, *R. E. & C. E. Fries* 538. Kenya Prov.: Escarpment, 1900–2200 m., *E. Battiscombe* 41, and at 2200 m., *A. Linton* 174, also *C. F. Elliott* 158 and 250.

var. **parvifolia** *Marquand*, var. nov.; a typo differt foliis minoribus vix 2 cm. longis 1 cm. latis integris.

ERITREA. Ainsaba, May 1870, *Beccari* 69.

The leaves of this plant are very distinct in their exceedingly small size, but it is possible that this may be largely due to the very dry conditions under which it was growing, the range of fluctuation in this respect being known to be large in some species of this genus. In floral characters this variety scarcely differs from the type of the species except that the inflorescence is slightly reduced.

30. **Buddleja Griffithii** *Marquand*, sp. nov. ; ex affinitate *B. macrostachyae* Benth. sed floribus minoribus vix ad 6 mm. longis inter alia differt. *B. macrostachya* Benth. var. *Griffithii* C. B. Clarke in Hook. fil. Fl. Brit. Ind. iv. 81 (1883).

Shrub. *Branches* subtetragonous, scarcely winged, sparsely tomentose or glabrescent. *Leaves* opposite, lanceolate, usually 15–20 cm. long, 2·5–3·5 cm. wide, margin minutely serrate, apex attenuate, upper surface glabrescent, lower surface clothed with a thin tomentum. *Stipules* absent. *Inflorescence* composed of terminal and axillary spike-like panicles 20–30 cm. long, 1–1·5 cm. wide. *Bracts* linear, 3–12 mm. long. *Flowers* rather densely crowded on short pedicels. *Calyx* tomentose ; tube 1 mm. long, 1·5 mm. in diameter ; lobes narrowly triangular acute, scarcely as long as the tube. *Corolla* lead blue with an orange throat, exterior tomentose ; tube 4–5 mm. long, less than 1 mm. in diameter, interior pubescent ; lobes 4 suborbicular 1–1·5 mm. in diameter, margin slightly erose. *Stamens* inserted just below the mouth of the corolla tube, anthers subsessile, scarcely 1 mm. in length. *Ovary* tomentose ; style short. *Fruit* 4–5 mm. long. *Seeds* shortly tailed, scarcely 1 mm. long.

EAST BENGAL. Mishmee, *Griffith* (Kew Distrib.) 3747.

BHUTAN : fruiting without precise locality *Griffith* 2447 and (Kew Distrib.) 3743.

This plant is noted in ms. by C. B. Clarke from the Naga Hills, but there is no specimen from this locality in Herb. Kew.

31. **B. limitanea** *W. W. Smith* in Notes Roy. Bot. Gard. Edin. ix. 85 (1916).

YUNNAN. Open scrub on the western flank of the Shweli-Salween divide, lat. 25° 20′ N., 2100–2400 m., shrub of 1–1·5 m., in fruit, Aug. 1912, *G. Forrest* 8962 ; shrub up to 1·5 m. high, thickets at the foot of the mountain near Talifu, 2400 m., Aug. 1914, *C. Schneider* 2487 ; " duplicate of 1912-13 " (without precise locality), *G. Forrest* 15851; open scrub in the Shweli Valley, lat. 25° 20′ N., shrub of 1·5–2 m., flowers deep rose, 1800–2100 m., July 1917, *G. Forrest* 15936 ; in open thickets, Swheli-Salween divide, 2400 m., shrub of 1–1·5 m., flowers rose purple, June 1918, *G. Forrest* 17546.

32. **B. Cooperi** *W. W. Smith* in Notes Roy. Bot. Gard. Edin. x. 14 (1917).

Bhutan. Between Rudong La and Pumthang, bush of 60–90 cm. on gravel and debris. Flowers white, tinged purple, 3400 m. July 23, 1915, *Cooper* 4154.

33. **B. asiatica** *Lour.* Fl. Cochinch. 72 (1790). — *B. acuminatissima* Blume Bijdr. 743 (1825). *B. discolor* Roth Nov. Pl. Sp. 83 (1821). *B. lanceolata* Heyne ex Wall. Cat. sub no. 640. *B. salicina* Lam. Tab. Encyclo. et Méth. i. 291 (1791). *B. serrulata* Roth Nov. Pl. Sp. 82 (1821). *B. subserrata* Buch.-Ham. ex D. Don Prod. Fl. Nep. 92 (1825). *B. virgata* Blanco Fl. Filip. ed. I. 57 (1837).

Madras. Pulney Mountain, Sept. 1836, *Wight* 1811; Nilgiris, 1900 m., Aug. 1883, *Gamble* 12257; Sigur Ghat, 900 m., Aug. 1886, *Gamble* 17892; Kodaikanal Ghat, Dec. 7, 1898, *Bourne* 1607.

Formosa. Bankinsing, *A. Henry* 260; Tamsuy, *Oldham* 318.

Indo-China. Hue and vicinity (the type-locality), Jan.-May 1927, *R. W. Squires* 296.

Szechuan. Min River and Omei 1100 m., *Faber* 608.

The above are only representative. The specimens of this species in Herb. Kew. are too numerous to enumerate here. The range of the species includes Sikkim, Bhutan, Assam, Bombay, Madras, Burma, Siam, Tonkin, Yunnan Szechuan, Kwangtung, Formosa, Java, Sumatra, Borneo and the Philippine Islands.

This is an exceedingly polymorphic species. A number of varieties have been described, some of which were originally accorded specific rank. Although some are distinct enough in their extreme forms they are completely connected by intermediates. The best marked of these varieties are the following from Java: — var. **sundaica** *Koorders* in Meded. 's Lands Pl. lxi. 93 (1903), distinguished by the inflorescence up to 25 cm. long, calyx lobes shorter than the tube, and cymules 1–3-flowered; var. **densiflora** *Koorders* l.c., with a short uninterrupted inflorescence, and cymules 3–7-flowered, and calyx lobes shorter than the tube; var. **salicina** *Koorders* l.c. with the inflorescence thin and interrupted, and calyx lobes as long as the tube.

34. **B. Neemda** *Buch.-Ham.* ex Roxb. Fl. Ind. ed. Carey et Wall. i. 411 (1820); Benth. Scroph. Ind. 43 (1835); Benth. in DC. Prodr. x. 446 (1846); Bot. Mag. t. 6323.

N.W. Himalaya. Punjab: Dehra Dun, April 1834, *Jamieson* 507; on river banks in the Punjab plain, 300–1200 m., Oct. 1846, *Thomson*; River Dak, Husa, March 20, 1871, *Aitchison* 491; Hurroo, March 24, 1872, *Aitchison* 1094; Gurdaspur, 2000 m., March 8, 1885, *Drummond* 1713; Thakor, March 1885, *Nanak* in *Herb. Drummond* 1714; dry hillside near Abbottabad, "only seen in one place as yet," Feb. 1902, *Barritt* 66 in *Herb. Drummond* 21972, without precise locality, *Drummond* 25488; small shrub, white, scented, Gurdaspur, Feb. 6, 1917, *R. R. Stewart* 1056.

This species is very different from the type of the preceding species in the much larger flowers with wide corolla tube and lobes

spreading to a diameter of 5–8 mm. instead of small and erect. They have been united by most authors. *B. asiatica* has a more southern and eastern distribution, but in parts of India and China some forms approach this species and it is possible that natural hybrids occur. On the other hand the present species resembles some forms of *B. polystachya*, which may be distinguished by its tomentose ovary.

35. **B. Davidii** *Franch.* in Nouv. Arch. Mus. Paris, Sér. 2, x. 65 (1887-88).—*B. variabilis* Hemsl. in Journ. Linn. Soc., Bot. xxvi. 120 (1889).

Tibet. Kam : without precise locality, Aug. 1, 1893, *Potanin*.

Szechuan. Mt. Omei, *Faber* 604 and 606; Tatsien-lu, July 13, 1893, *Potanin*; without precise locality, Aug. 7, 1893, *Potanin*; Mao chou, Aug. 27, 1893, *Potanin*; Tatsien-lu, 1893, *Soulié* 778 and 919; mountains, S. Wushan, bush of 1·5 m., flowers purple, July 1900, *E. H. Wilson* (Veitch Exped.) 1347; Min Valley, 1950 m., bush of 60–120 cm., flowers purple, Aug. 1903, *E. H. Wilson* (Veitch Exped.) 4120, Mt. Omei, July 1904, *E. H. Wilson* (Veitch Exped.) 5039, and Aug. 1904, 5038; bush 1–2 m., flowers purple, side of streams, Mupin, 2300 m., Aug. 1908, *E. H. Wilson* (Arn. Arb. Exped.) 3349; Hsien, 1300–2000 m., bush 2 m. high, flowers rose purple, side of streams West of and near Wen-ch'uan, *E. H. Wilson* (Arn. Arb. Exped.) 3350.

Hupeh. Ichang without precise locality, *A. Henry* 156, 1069, 2351, 3110a, 3110b, 4166a; Nanto and mountains to northward *A. Henry* 2060, 2668; Patung, shrub of 3 m. spreading with lilac flowers, *A. Henry* 7008; W. Hupeh, without precise locality, July 1900, *E. H. Wilson* (Veitch Exped.) 1347, 1347a; Patung mountains, bush 1·5 m. high, flowers purple, Aug. 1900, *E. H. Wilson* (Veitch Exped.) 1569; hills, Ichang, bush 1 m. high, flowers purple, Oct. 1900, *E. H. Wilson* 1738; by the side of streams north and south of Ichang, 1300–2000 m., bush 1–2·5 m. high, flowers purple, Aug. and Sept. 1907, *E. H. Wilson* (Arn. Arb. Exped.) 613a; thickets, Hsing-shan Hsien, 1300–2300 m., bush 1·5–2 m. high, flowers purple; Aug. and Oct. 1907, *E. H. Wilson* (Arn. Arb. Exped.) 3347.

var. **alba** *Rehd. & Wils.* in Sargent Pl. Wilson. i. 568 (1913).

W. Szechuan. Lugan Fa, Tu-ti-liang-shan, 1800 m., Oct. 1910, *E. H. Wilson* (Arn. Arb. Exped.) 4638.

Distinguished by the white flowers.

var. **magnifica** *Rehd. & Wils.* in Sargent Pl. Wilson. i. 567 (1913).

W. Szechuan. Lugan Fu, Tu-ti-liang-shan, 1800 m., bush 2–2·5 m. high, flowers violet purple, Aug. 1910, *E. H. Wilson* (Arn. Arb. Exped.) 4639.

W. Hupeh. Without precise locality, June, 1900, *E. H. Wilson* (Veitch Exped.) 1249; Hsing-shan Hsien, in thickets 1600–2300 m., flowering specimen only, bush 2 m. high, flowers vinous purple fragrant, July 1907, *E. H. Wilson* (Arn. Arb. Exped.) 613 *pro parte*; side of streams, Patung Hsien, bush 1·5–2·5 m. high, flowers

rosy-purple, fragrant, Aug. 1907, *E. H. Wilson* (Arn. Arb. Exped.) 3346.

Distinguished by the very large dense-flowered inflorescence and the margin of the corolla lobes reflexed.

var. **superba** *Rehd. & Wils.* in Sargent Pl. Wilson. i. 568 (1913).

W. Hupeh. Side of streams, Hsing-shan Hsien, 1600–2300 m., fruiting specimens only, Oct. 1907, *E. H. Wilson* (Arn. Arb. Exped.) 613 *pro parte.*

Distinguished by the extremely dense flowers with flat corolla lobes which are fimbriate but with margins not reflexed. This exceedingly polymorphic species has been cultivated extensively, and several other varieties founded on habit, time of flowering, etc. are known to the author from garden material only.

36. **B. Delavayi** *Gagnepain* in Lecomte, Not. Syst. ii. 190, 193 (1912).—*B. glabrescens* W. W. Sm. in Notes Roy. Bot. Gard. Edin. ix. 85 (1916).

Yunnan. Oha-pin-keou, in a wood, Aug. 7, 1889, *Delavay* 3939; open situations amongst scrub at the North end of the Chien-Chuan Valley, lat. 27° N., 2400–2700 m., shrub of 1·5–3 m., flowers very deep blue-lavender, throat and tube tinged rose, fragrant, May 1914, *G. Forrest* 12433; on the Chungtien plateau, lat. 27° 30′ N., 3000 m., July 1914, *G. Forrest* 12753; in open scrub on the Shweli-Salween divide, lat. 25° 30′ N., 3000–3400 m., shrub of 2 m., flowers lilac-rose, fragrant, May 1917, *G. Forrest* 15664; amongst scrub by streams, N'Maikha-Salween divide lat. 26° 30′ N., 2400 m., shrub of 2–3 m., flowers rose-lavender? faded when collected, July 1919, *G. Forrest* 18199.

37. **Buddleja hastata** *Prain* ms., sp. nov.; ex affinitate *B. agathosmae* Diels et *B. tibeticae* W. W. Sm. sed limbo corollae ad 1 cm. diametro calyce 9 mm. longo distinctissima.

Shrub. Branches terete, densely tomentose. *Leaves* hastate, 15–20 cm. long including the winged petiole, 4–6 cm. wide, apex acute, margin crenate-dentate, upper and lower surfaces clothed with a thin tomentum. *Stipules* auriculate. *Inflorescence* terminal and axillary, with the flowers in very dense subglobose whorls 3–4 cm. in diameter. *Bracts* numerous, densely tomentose, linear-lanceolate, up to 2·5 cm. in length. *Flowers* very large. *Calyx* densely tomentose, tube 5 mm. long, lobes 4 linear subobtuse 4 mm. long. *Corolla* glabrous; tube 8–10 mm. long, 1·5 mm. wide; lobes 4 broadly obovate or suborbicular 4 mm. long, 3–4 mm. wide. *Stamens* 4, inserted just above the middle of the corolla tube, anthers subsessile scarcely 1·5 mm. long. *Ovary* tomentose; style short, tomentose below. *Fruit* not seen.

S. Tibet. Between Gyantse and Phari, July-Sept. 1904 (Tibet Frontier Commission), *H. J. Walton.*

A barren specimen from the Kyichu valley, 15 miles east of Lhasa, also collected by Capt. Walton, probably belongs to this species.

38. **B. agathosma** *Diels* in Notes Roy. Bot. Gard. Edin. v. 248 (1912).

YUNNAN. On exposed cliffs to the west of Yunnan fu, 2400 m., shrub of 1·5–3 m., flowers purplish lavender, very fragrant, Feb. 1905, *G. Forrest* 593.

var. **glandulifera** *Marquand*, var. nov.; a typo differt corolla extus glandulis sessilibus dense vestita.

YUNNAN. In thickets on dry slopes on the Yang-Dza Shan, Mekong-Salween divide, lat. 28° 18′ N., long. 98° 43′ E., 2400-2700 m., shrub of 1–2 m., flowers deep violet-lilac, fragrant, May 1921, *G. Forrest* 20143.

This is a rather well-marked variety distinguished by the corolla being clothed with sessile glands on the outside.

39. **B. salviifolia** *Lam.* Encycl. i. 513.—*B. aurantiaco-maculata* Gilg. in Engl. Jahrb. xxx. 377 (1901). *Lantana salviifolia* Linn. Syst. ed. x. 1116 (1759).

NYASALAND. Zomba 1800–2100 m., Sept. 1859 *Kirk*; Zomba Plateau 1500 m., Sept. 5, 1895, *A. Whyte*; without precise locality, *J. Buchanan* 654; Nyika Plateau, 1800–2100 m., June 1896, *A. Whyte*; Nachari, 2400 m., Sept. 1902, *J. McClounie*; Kondowe to Karonga, 600–1800 m., July 1896, *A. Whyte* 365.

RHODESIA. Melsetter District; 1800 m., "a shrub with very strongly mignonette-scented whitish flowers," Sept. 21, 1906, *C. F. M. Swynnerton* 609 and Sept. 23, 1906, 675; Imyanga, Aug. 1920, *J. S. Henkel* in *Herb. Eyles* 2590. Umtali District; Vumba mountains, in forest at "Cloudlands" 1600–1700 m., July 8, 1927, "tree 5 m., flowers lilac," *E. E. Galpin* 9256.

TANGANYIKA. Langenburg District; Rungwe mountains, Oct. 25, 1910, flowers light reddish-brown, *A. Stolz* 379.

PORTUGUESE EAST AFRICA. Massekessi District; Vumba mountain, shrub 0·6–2 m., flowers lilac, Aug. 1911, *M. T. Dawe* 388.

SOUTH AFRICA:—Western Region: Clanwilliam Div.; Wupperthal, 1836, *Drège* 699c; Bull. Hoek. 150 m., Aug. 2, 1896 *Schlechter* 8373. Middelburg Div.; Sneeuwberg lower and middle slopes, Dec. 11, 1910, bush of 1–1·5 m., *Pearson and Pillans* (Percy Sladen Memorial Expedition) 5806.

Coastal Region: Bedford Div.; near Bedford, *Mrs. Hutton*; Stockenstrom Div.; Kat Bey, *Henry Hutton*; Caledon Div.; Zwarb Berg, *Zeyher* 3526; Caledon, Oct. 1, 1846, *Prior*; and Jan. 22, 1894, *Otto Kuntze*; George Div., about the source of the Keurbooms River in Long Kloof March 20, 1914, *Burchell* 5077; in the wood under the mountain, George, Aug. 6, 1847, *Prior*; on the hill near George, 300 m., March 27, 1893, *Schlechter* 2418; between Gauritz River and Long Kloof, 1836, *Ecklon & Zeyher* 1328; Knysna Div.; Kaatjes Kraal, near Yzer Nek, March 30, 1814, *Burchell* 5202, between Keurbooms River and Biton River, April 10, 1814, *Burchell* 5284; Uitenhage Div.; between Galgebosch and Melk River, Feb. 17,

1814, *Burchell* 4766 ; banks of the Zwartkops River, *Zeyher* 461 ; valley of Zwartkops River, Dec. 30, 1847, *Prior* ; Port Elizabeth Div. ; Algoa Bay, Dec. 1847, *Prior* ; Humansdorp Div., Karedoun Pass 300 m., March 1926, *H. C. Fourcade* 3221.

Central Region : Somerset Div. ; on Bosch Berg, erect shrub of 2·5–3 m., June 11, 1813, *Burchell* 3226 ; (*Mrs.*) *Barber* 8 ; 1100 m., *MacOwan* 927 ; Queenstown Div. ; near Queenstown, 1860, *Cooper* 193 ; Shiloh, *Bauer* 244 (pro parte) ; Hangklip mountain 1800–2000 m., 1893, *E. E. Galpin* 1623 ; Graaff Reinet Div. ; Oude Berg 900–1200 m., *Drège* ; Beaufort West Div. ; Nieuwveld mountains, near Beaufort West 900 -1500 m., *Drège* 699a : Albert Div. ; without precise locality 1861, *Cooper* 697.

Ka'ahari Region : Basutoland ; without precise locality 1861, *Cooper* 695 ; Lefibé, *M. & Mme. Dieterlen* 54 ; Transvaal ; Magaliesberg Range, Sept., *Burke* 370 ; at the bottom of mountain ravines, Rimer's and other creeks near Barberton, shrub of 1·5–3 m., Sept. 1889, *E. E. Galpin* 481 ; Barberton, Sept. 1906, *Thorncroft* in *Trans. Mus. Herb.* 2847 ; Lydenberg Div. ; on the sides of streams in the Macamao Gold Fields, June 1874, *McLea* in *Herb. Bolus* 467 ; near Lydenberg and near Spitzkop, Aug. 1887, *Wilms* 1027 ; Lydenberg May 1915, *Rogers* 14687 ; Pretoria, July 20, 1904, (*Miss*) *Leendertz* 187 ; Rustenberg Div. ; 1300 m., Aug. 1904, without precise locality, *Miss Pegler* in *Herb. Nation.* 296 ; near river at Krondaal, 1300 m., Sept. 1905, *Miss Nation* 344 ; Zoutpansberg Div., without precise locality, Dec. 20, 1909, *W. C. Worsdell* ; Pretoria, The Fountains, Oct. 1903, *J. Burtt Davy* 2357 ; Forest near Pilgrim's Rest, May 1905, *Grenfell* 864.

Eastern Region : Tembuland : Umtata Div. ; Transkei, Bazeia, *Baur* 244 ; Pondoland ; between St. John's River and Umtsibeaba River, *Drège* ; Natal, summit of Table Mountain, 1840, *Krauss* 447 ; banks of the River Umtwalumi, *Gerrard* 1850, and without precise locality, *Gerrard* 1211 ; Mont-aux-Sources, hillside and flats as pioneer scrub in the Lugela Valley, very common 1500 m. Feb. 15, 1926, *B. McLean* 84 ; Alexandra Div. ; Dumisa, tree of 6 m., 1100 m. Aug. 22, 1911, *H. Rudatis* 1442 ; Van Reenen, 1500–1800 m. Nov. 5, 1894, *J. Medley Wood* 5491.

40. **B. crispa** *Benth.* Scroph. Ind. 43 (1835) ; Wall. Cat. 6404.

Baluchistan. Chihil Tan and Zahree, 1851, *J. E. Stocks* 867 : Urak, June 1886, *Lace* ; Larghun, 2300 m., May 4, 1888, *Lace* 3842 ; Gustoi May 25, 1897, *Harsukh* in *Herb. Duthie* 20591.

Afghanistan. Shaded bank, Otipore, March, *Griffith* 3744 ; shrub of 2 3 m. through the whole Kuram valley, 1879, *Aitchison* 189 ; same locality, *Harsukh* in *Herb. Duthie* 14921.

N. W. Himalaya. Without locality, *Wallich* 6404 ; 1200–2100 m., *Thomson*. Waziristan, Shakai, 1800–2100 m., April 30, 1895, *Duthie* 15686 ; Hazara, Kagan Valley 2200 m., May 18, 1896, *Inayat* in *Herb. Duthie* 19942a ; Simla, 2100 m., *Thomson* ; 1200–2100 m., 1844, *Edgeworth* ; April 15, *Lady Dalhousie* ; Elysium Hill

2100 m. April 21, 1877, *Gamble* 4145a, 4145c ; March, *Collett* ; stony places at the foot of the mountain, Krol between Kasauli and Simla 600 m., April 13, 1885, *Drummond* 2802 ; Ladies Mile, Jako, Simla, May 30, 1902, *Bourne* 3719 ; Kumaon Laharkot, 1800 m., *Strachey & Winterbottom* 1 ; Almorah 1600–2200 m. *Madden* ; Punjab, Dalhousie Road above Donera, 900 m. Feb. 22, 1917, *R. R. Stewart* 1268a ; Dharmcot, Dharmsala 2400 m. May 18, 1917, *R. R. Steward* 1867.

BHUTAN. *Griffith* 1009, 2446.

41. **B. caryopteridifolia** *W. W. Smith* in Notes Roy. Bot. Gard. Edin. viii. 179 (1914).

YUNNAN. Open situations on the Tong Shan in the Yangtze bend, lat. 27° 20′ N., 3000 m., shrub of 1·5–2 m., flowers pale lavender, Sept. 1913, *G. Forrest* 11016 ; east of Likiang, 1450–2100 m., flowers violet, July 3, 1914, *Handel-Mazzetti* 3405 ; open, dry situations on the Yung-peh mountains, lat. 26° 40′ N., 2400 m., shrub of 1·5 m., flowers pale lilac-rose, fragrant, Aug. 1917, *G. Forrest* 15311 ; amongst rocks in dry situations on the Leilung Shan, lat. 28° 12′ N., 3000 m., shrub of 60–120 cm., flowers grey, fragrant, Sept. 1917, *G. Forrest* 15317 ; in thickets on dry bouldery hillsides on the hills around Yung-peh, lat. 26° 40′ N., long. 100° 45′ E., 1500–1800 m., shrub of 1·5 m., flowers fragrant, rose-lavender, July 1921, *G. Forrest* 21188 ; dry stony hillsides amongst scrub on the Chien-Chuan—Mekong divide, lat. 26° 30′ N., long. 99° 40′ E., shrub of 60–120 m., flowers, exterior grey, interior violet-lavender, fragrant, 2700–3000 m., Aug. 1922, *G. Forrest* 23238.

var. **eremophila** *Marquand.—B. eremophila* W. W. Smith in Notes Roy. Bot. Gard. Edin. viii. 179 (1914).

YUNNAN. Arid regions above the Yangtze, 3000 m., compact dwarf shrub of 30–60 cm., May 1913, *F. Kingdon Ward* 304; above the Yangtze between Yungpeh and Likiang 1800 m., July 3, 1914, *C. Schneider* 1736 ; near Ndaku, lat. 27° 20′ N., 1750–2250 m., Aug. 1, 1914, *Handel-Mazzetti* 4389 ; dry stony pasture on the Muli mountains, valley of the Litang, lat. 28° 12′ N., 3000 m., shrub of 0·5–1 m., flowers dull rose, exterior grey, June 1918, *G. Forrest* 16258 ; open situations in thickets, Muli mountains, lat. 28° 12′ N., 3000 m., shrub of 1·5 m., flowers deep blue lavender, Oct. 1918, *G. Forrest* 19139, 18687 ; dry stony slopes and amongst rocks on the Bey-ti Shan, lat. 27° 45′ N., long. 100° 18′ E., 2100 m., stunted shrub of 30–60 cm., flowers soft bluish-rose, fragrant, July 1921, *G. Forrest* 20543 ; open dry situations amongst scrub on the divide between the Yangtze and Yungning valleys, lat. 27° 42′ N., long. 100° 30′ E., 1800–2100 m., shrub of 60–90 m., flowers exterior grey, interior purplish-rose, June 1922, *G. Forrest* 21273 ; dry hillsides amongst scrub and rock on the hills above Feng-kou, lat. 27° 40′ N., long. 100° 26′ E., 1800 m., shrub of 1–1·3 m., flowers exterior grey, interior pale lavender, June 1922, *G. Forrest* 21280.

Though very distinct in its typical form with leaves scarcely 1 cm. long, this is connected with the type of *B. caryopteridifolia* by a

complete chain of intermediates so that one is forced to consider the whole series as one polymorphic species. In cultivation the species exhibits a very wide range of variation. Of the specimens enumerated above, *Handel-Mazzetti* 4389 is almost exactly equidistant between the type and variety.

var. **lanuginosa** *Marquand*, var. nov.; a typo differt foliis utrinque dense lanuginosis corollae tubo ad 1·5 mm. lato.

YUNNAN. Open dry, stony pasture, Muli mountains, lat. 28° 12′ N., 3000 m., shrub of 60–90 cm., flowers deep, soft rose, exterior white, fragrant, Aug. 1918, *G. Forrest* 16639; dry bouldery slopes on the hills, north of Yungpeh, lat. 26° 40′ N., long. 100° 45′ E., 2400 m., shrub of 60–90 cm., flowers fragrant, exterior grey, interior rose-lavender, Aug. 1921, *G. Forrest* 21175.

This is a rather distinct variety with wider corollas than the type. The young stems and leaves are clothed with a very thick tomentum.

42. **B. brachystachya** *Diels* in Notes Roy. Bot. Gard. Edin. v. 249 (1912).

YUNNAN. In dry exposed situations amongst rocks, on the descent from the Lu-po pass to the Salween, Mekong-Salween divide, lat. about 27° N., 2100–2400 m., dwarf shrub of 30–45 cm., flowers lavender colour and fragrant, *G. Forrest* 1076.

43. **B. nana** *W. W. Smith* in Notes Roy. Bot. Gard. Edin. viii. 126 (1913).

YUNNAN. Moist open situations on the divide between the Shayang and Chu-tong valleys, lat. 25° 20′ N., 2000 m., dwarf shrub of 30–60 m., flowers greyish-lavender, April 1910, *G. Forrest* 5519.

44. **B. auriculata** *Benth.* in Hook. Comp. Bot. Mag. ii. 60 (1836).

S. AFRICA:—Coastal Region: Fort Beaufort Div., Winterberg 1836, *Ecklon* (flowers white, yellow in the throat); Stockenstrom Div., Chumie Berg, 1836, *Ecklon*; Katberg, *Henry Hutton*; Klarf, summit of the Katberg, May 1869, *J. Shaw*; Katberg, 1200 m., *R. Baur* 874.

Central Region: Somerset Div., near Somerset, on Bosch Berg, May 29, 1813, *Burchell* 3157; and June 1813, *Burchell* 3179; Griqualand East, Maclear Div., Potrivers Berg, wooded kloof 1700 m., March 20, 1904, *E. E. Galpin* 6771.

Kalahari Region: Transvaal; Barberton, June 1905, *I. Thorncroft* 4343; Pietersburg, "The Downs," 1500 m., July 1917, *F. A. Rogers* 20167.

Eastern Region: Xalanga Div., Cala, hillside near Bushman's painting, 1200 m., March 29, 1910, *Alice Pegler* 1741.

var. **euryifolia** *Prain & Cummins* in Dyer Fl. Cap. iv. II. 1048.

S. AFRICA:—Kalahari Region: Transvaal: Rimer's Creek, Barberton, 900 m., shrub of 1·5–2·5 m., corolla tube orange, limb pale lilac, July 1890, *E. E. Galpin* 970; in abandoned Kaffir Kraals near

Lydenberg, June 1889, *F. Wilms* 1030; Sabie Lock, near Pilgrim's Rest, Aug. 1904, *J. Burtt Davy* 2437; Waterval Boven, June 10, 1905, *F. A. Rogers* 984; shrub of 1–2 m., Mount Fletcher, *J. R. Sims* 2536.

Eastern Region: Natal: Tugela River, *Gerrard* 1967; Griqualand East; near Kokstad, in Umzimhlava Woods 1200 m., May 1883, *Tyson* 1287.

This variety is distinguished from the type of the species in the leaves being densely pubescent on the under surface with the nerves and veins deeply impressed.

45. **B. heliophila** *W. W. Smith* in Notes Roy. Bot. Gard. Edin. viii. 126 (1913).

Yunnan. Open, sunny situations along the base of the eastern flank of the Tali Range, lat. 25° 40′ N., 2100–2400 m., shrub of 1–2 m., flowers soft magenta rose shading to crimson at base, July 1910, *G. Forrest* 6796; shrub of 1·2–1·6 m., corolla-tube lavender-rose, limb lavender, throat deep red orange, fragrant; open scrub in dry situations on the Langkong Ho-Ching divide, lat. 26° 16′ N., 2400 m., May 1913, *G. Forrest* 9984; open scrub in dry situations on the Langkong divide, lat. 26° 16′ N., 2400–2700 m., shrub of 2–2·5 m., flowers, tube bluish-rose, limb pale soft blue, May 1913, *G. Forrest* 9988; open thickets on the western flank of the Tali Range, lat. 25° 40′ N., 3000 m., shrub of 1·5–2 m., flowers rose-lavender, fragrant, June 1917, *G. Forrest* 15622.

var. **angustifolia** *Marquand*, var. nov.; a typo differt foliis anguste lanceolatis acuminatis calyce pubescente.

Yunnan. In open thickets by streams and on the margins of forests, Shweli-Salween divide, lat. 25° 20′ N., long. 98° 56′ E., 2700-3000 m., shrub 2–3 m. high, flowers soft greyish rose, strongly fragrant, April 1924, *G. Forrest* 24069.

This variety is distinguished by the thin narrow leaves, acuminate at the apex, and the sparse hairs on the calyx.

var. **pubescens** *Marquand*, var. nov.; foliis ovato-lanceolatis calyce pubescente a typo differt.

Yunnan. Dry scrubby banks on the margins of pine forests on the hills around Beta-pu, lat. 25° 30′ N., long. 99° 48′ E., 2400–2900 m., shrub of 1–1·5 m., flowers pure pale soft rose-pink, drying purplish, fragrant, April 1921, *G. Forrest* 19357; dry banks amongst scrub on the margins of pine forests on the hills between Tai-ping-pu and Yangpi, lat. 25° 36′ N., long. 99° 54′ E., 2100–2400 m., shrub of 1·5–2 m., flowers rose-pink to soft lavender, fragrant, April 1922, *G. Forrest* 21121.

In this variety the leaves scarcely differ from the type of the species but the calyx is only sparsely hairy, not tomentose.

46. **B. officinalis** *Maxim.* in Bull. Acad. Pétersb. xxvi. 496 (1893).

Szechuan. Ya-chon, April 5, 1893, *Potanin.*

Hupeh. Ichang Gorge, River Yangtze, *Maries*: Ichang, shrub in glens, etc., early in the year, *A. Henry* 1117, 1291, 1447, 1527, 3110, 7884; Ichang, shrub of 1–2·5 m., flowers lavender, on cliffs, etc. March 16, 1900, *E. H. Wilson* (Veitch Exped.) 155, 155a; Ichang cliffs, etc., 300–600 m., March 24, 1908, *E. H. Wilson* (Arn. Arb. Exped.) 4005.

Kwei-chow. River Yangtze, without precise locality, *E. Faber* 605.

Yunnan. Flowers lilac, Red River, 3000 m., *A. Henry* 9749.

47. **B. acutifolia** *C. H. Wright*, in Kew. Bull. 1896, 24. *B. lavandulacea* Kränzl. in Engl. Jahrb. i. Beibl. 111, 42 (1913). *B. Mairei* Lévl. in Fedde Repert. xiii. 258 (1914).

Bhutan. *Griffith* 2444 (Kew. Distr. No. 3745).

Burma. Sadon, 2000 m., flowers white, Feb. 1900. *Shaik Mokim* 63; Bhamo District, Sinlum Kaba, 1500 1800 m., April 11, 1912, *Lace* 5779; Myitkyina district, Lankkaung 1300 m., April 23, 1929, *Su Koe* in *Herb. Parkinson* 9117.

Yunnan. Very common in hedges and wastes, Mengtze, flowers lavender, fragrant, March 1893, *Hancock* 143; Szemao, February, *Bons d' Anty* 3; Mengtze, 1400 m. shrub 2 m. to tree 5 m., flowers lavender, *A. Henry* 10178; forests on mountains east of Szemao, 1500 m., shrub of 3 m., with lilac flowers, *A. Henry* 11619; hills Tai-pou, 2500 m., large shrub with lavender flowers, *E. E. Maire* 467; Mo-tsou, 600 m., *E. E. Maire* (sine numero); without precise locality, *E. E. Maire* 2487; generally in dry situations, common from Yunnan fu to Talifu, 2000–2700 m., shrub of 1 2·5 m., flowers white with lavender centre, fragrant, Feb. 1905, *G. Forrest* 2; open situations, hills to the south of Tengyueh, lat. 25° N., 1800–2100 m., shrub of 3 m., flowers interior creamy white, exterior pale purplish, fragrant, Feb. 1913, *G. Forrest* 9550; amongst scrub in open situations, south end of Kau-guai Valley, lat. 24° 30′ N., 900 m., shrub of 2 3 m., flowers, tube dull lavender rose, limb buff, throat orange red, fragrant, Jan. 1913, *G. Forrest* 9494; Yunnan fu, shrub of 2·5 m., flowers white with orange throat, Feb. 8, 1914, *C. Schneider* 45; between Ssiao-ma-kai and Schin lun, flowers white within, lilac outside, March 9, 1914, *C. Schneider* 302; 1900 m., tall shrub roadsides and walls, April 20, 1916, *O. Schoch* 41; *Schneider* 361.

Kwei-chow. Pin-fa, April 1907, *J. Cavalerie* 3097, 8082, 8140.

Kwang-si. On hills and glens Lungchow, shrub of 60 90 cm., flowers lavender, *Morse* 278; Lungchow, shrub of 1–1·5 m., flowers white, orange throat, *Morse* 466, 467.

48. **B. myriantha** *Diels* in Notes Roy. Bot. Gard. Edin. v. 250 (1912).—*B. asiatica* var. *stipulata* Gagnep. in Lecomte Not. Syst. ii. 189 (1912) (nomen nudum).

Upper Burma. In thickets of the lower ridges of the N'Maikha-Salween divide, lat. 27° 17′ N., long. 98° 46′ E., 2700 m., shrub of 1·5–2 m., flowers purple or soft rose-lavender, fragrant, July 1925, *G. Forrest* 27055, 27536.

S.E. Tibet. Tsarong : dry situations on the margins of thickets on the Salween—Kiu-chiang divide, lat. 28° 40′ N., long. 98° 15′ E., shrub of 2–2·5 m., flowers soft rose-lavender, fragrant, July 1919, *G. Forrest* 19235.

Yunnan. Above Tali at the foot of the Sang Shan, Sept. 25, 1888, *Delavay* 3627 ; without precise locality, *Ducloux* 444 ; dry open situations on the borders of pine woods, western slopes of the Isen Shen range, Yang-pi pass, lat. 25° 40′ N., 2100–2700 m., shrub of 2–3 m., flowers dull purple, Sept. 1905, *G. Forrest* 912 ; at the foot of the mountain near Tali fu, 2500 m., shrub of 1·5 m., flowers pale violet, Aug. 1914, *C. Schneider* 2503 ; in open thickets by streams on the Mekong-Salween divide, lat. 27° 36′ N., long. 98° 56′ E., 2400-2700 m., shrub of 2–4 m., flowers dull rose, hispid white exterior, fragrant, July 1921, *G. Forrest* 19804.

Kwei-chow. Shrub with white flowers, *J. Esquirol* 581.

Note. This species is very closely allied to the Szechuan species *B. alata* (No. 28).

49. **B. Fallowiana** *Balf.* fil. *& W. W. Smith* in Notes Roy. Bot. Gard. Edin. x. 15 (1917).—*B. macrostachya* Benth. var. *yunnanensis* Diels in Notes Roy. Bot. Gard. Edin. vii. 145 (1912).

Yunnan. Dry stony situations along base of the eastern flank of the Lichiang Range, lat. 27° 12′ N., 2700 m., branched shrub of 2 4 m., flowers rich lavender, throat of corolla orange, fragrant, with an odour resembling vanilla, July 1906, *G. Forrest* 2599 ; by streams at the north end of the Lichiang Plain, lat. 27° 20′ N., 2700 m., shrub of 1·5–3 m., flowers soft lavender, throat orange, fragrant, July 1910, *G. Forrest* 6047 ; stony situations by streams on the eastern flank of the Lichiang Range, lat. 27° 30′ N. 2700–3000 m., shrub of 1–1·5 m., flowers lavender, throat orange, strongly fragrant, Aug. 1910, *G. Forrest* 6285 ; Lichiang Range, lat. 27° 15′ N., 2500-3000 m., July 1913, *G. Forrest* 10591 ; shrub of 2 m., flowers lilac. Ngu leh-keh in the neighbourhood of Lichiang, 3000 m., July 29, 1914, *C. Schneider* 2054 ; at the foot of the snow clad mountains near Lichiang, 3000 m., Aug. 6, 1914, *C. Schneider* 3399 ; open pasture on the hills around Tengyueh, lat. 25° N., 1800 m., compact shrub of 1–1·5 m., flowers fragrant, very dark rose-lavender, May 1919, *G. Forrest* 17790 ; open thickets by streams on the N. W. flank of the Lichiang Range, lat. 27° 20′ N., long. 100° 10′ E., 3000 m., shrub of 1·5–2·5 m., flowers fragrant, soft lavender-purple, Aug. 1922, *G. Forrest* 23179.

There are several forms of this species in cultivation differing slightly in flower colour.

50. **B. candida** *Dunn* in Kew. Bull. 1920, 134.

Eastern Himalaya. Outer Abor Hills, low bushes scattered in the sward, Sidi river mouth and opposite Yambung on the north side of the Dihang, *Burkill* 37631 ; Tsangpo gorge, Gompa Ne, on cliffs and rocks in open sunny places in the river bed and up the

bracken and grass clad slopes above, 1500 m., shrub of 2-3 m. with very flannelly whitish leaves and small racemes of violet flowers, Dec. 9, 1924, *F. Kingdon Ward* 6372; Dihang valley, Abor Hills, small shrub 2·5-3 m. high, leaves flannelly, the young shoots with a matt bronzy look, on rocks in the bed of the river, above flood level, growing in almost pure sand, 300 m., flowers probably quite small, in long spikes, Feb. 13, 1928, *F. Kingdon Ward* 7863.

51. **B. stenostachya** *Rehder & Wilson* in Sargent Pl. Wilson. i. 565 (1913).

Szechuan. Flowers pale purple, thickets Mupin, 1200–2400 m., Oct. 1908, *E. H. Wilson* (Arn. Arb. Exped.) 1351.

52. **B. tibetica** *W. W. Smith* in Rec. Bot. Surv. Ind. iv. 270 (1911).—*B. Whitei* Kränzl. in Engl. Jahrb. l. Beibl. 111, 46 (1913).

Tibet. Llalung valley, 3400 m., June 10, 1906, *J. C. White* 72.

var. **Farreri** *Marquand.—B. Farreri* Balf. fil. & W. W. Smith in Notes Roy. Bot. Gard. Edin. ix. 84 (1916).

Kansu. Arid places crevices, walls and banks; Ha Shui fang, Siku, Feng S'an Ling, and at the edge of the subalpine coppice below Chago, Sha-Tan-yu valley on the borders of the province, bush of 1·5–2 m., May 8, 1914, *Farrer & Purdom* 44.

Szechuan. Arid places 3400 m., shrub of 1·5 m. (without precise locality), July 1904, *E. H. Wilson* (Veitch Exped.) 4122: Wen chüan hsien near Scha pei, 1600–1700 m., April 26, 1914, *Limpricht* 1310.

var. **grandiflora** *Marquand* in Journ. Linn. Soc., Bot. xlviii, 202 (1929).

Tibet. Tsela Dzong, varying much in size and habit, scrubby thick bushes only 30–60 cm. high on the open rocky sun-scorched face of the mountain, to a large thick bush or tree in villages and by streams in more sheltered situations, "flowers lilac, purple, or almost white with orange eye, leaves variable, covered with silver or golden fur," 2700–3000 m., May 22, 1924, *F. Kingdon Ward* 5693; Tsangpo valley below Tsetang, small scraggy tree or large untidy bush up to 4–6 m. high, flowers bright purple with deep orange eye, fragrant, no leaves yet showing, 3000–3400 m., April 29, 1924. *F. Kingdon Ward* 5635.

var. **truncatifolia** *Marquand.—B. truncatifolia* Lévl. in Fedde Repert. xiii. 342 (1914).

Yunnan. Brittle shrub with white woolly leaves, flowers pink, Kiao-tche-keou, 2550 m., *E. E. Maire* (sine numero); valley of Tche-ka, 2500 m., large shrub, branches white, leaves cottony, flowers violet, rare, May (sine anno) *E. E. Maire* 376; open thickets on the western flank of the Tali Range, lat. 25° 40′ N., 300 m., shrub of 2–3 m. foliage only, Aug. 1913, *G. Forrest* 11528; Oua-gai-tchai, 2500 m., large bushy shrub, leaves and young branches white tomentose, flowers bluish-violet, hedges, *E. E. Maire* 329.

var. **glandulifera** *Marquand*, var. nov. ; a typo differt paniculis lateralibus ad 9 cm. longis 4 cm. latis corolla extus glandulis sessilibus dense vestita.

YUNNAN. Open dry situations on the Chungtien plateau, lat. 27° 45′ N., 3400 m., shrub of 1·5–3 m., flowers greenish-rose, fragrant, June 1917, *G. Forrest* 13871.

This is a very well marked variety. The inflorescences are much larger and less compact than the type and the exterior of the corolla is glandular.

Key to the varieties of *B. tibetica*.

Exterior of the corolla eglandular :
Branchlets tetragonous ; flower 6–8 mm. long.....*tibetica* (type)
Branchlets terete ; flower usually exceeding 10 mm. in length :
Panicle (up to 20 cm. long, 15 cm. wide) branches spreading at right angles ; corolla glabrescent on the exterior...var. *Farreri*
Panicle lateral compact (up to 5 cm. long, 3 cm. wide) ; corolla tomentose on the exterior :
Leaves cordate at the base ; petiole not winged ; nerves conspicuous on the underside.....var. *grandiflora*.
Leaves truncate at the base ; petiole winged ; nerves hidden by the very dense tomentum.....var. *truncatifolia*.
Exterior of the corolla glandular.....var. *glandulifera*.

Index of species and synonyms.

paniculata 21 ; polystachya 29 ; *Powellii* 29 ; pulchella 22 ; Purdomii 11.

salicifolia 7 ; *salicina* 33 ; *Saltiana* 29 ; salviifolia 39 ; *serrulata* 33 ; stenostachya 51 ; *subserrata* 33.

taliensis 17 ; tibetica 52 ; truncatifolia 52 ; tsetangensis 5.

usambarensis 22.

variabilis 35 ; venenifera 10 ; virgata 33.

Wardii 6 ; *Whitei* 52 ; *Woodii* 22.

yunnanensis 12.

Doubtful species.

B. acuminata Poir. Encyc. Suppl. i. 745 (1810)—Type (in Herb. Jussieu) not seen. India.

B. nepalensis Colla in Mem. Acad. Torino, xxxv. 182 (1835) (Hort. Ripul., App. 4, 38). Nepal.

B. otophylla Hassk. in Versl. en Med. Kon. Akad. Wentensch, v. 97 (1857). The type of this species has not been seen. In the original description it is compared with a Brazilian species.

B. Poiretii Spreng. Syst. Veg. i. 430 (1825). No specimen seen, origin doubtful.

B. ternata Lour. Fl. Cochinch. 72 (1790). The type of this species has not been seen, but from the description it is not a species of *Buddleja*.

B. truncata Gagnepain in Lecomte, Not. Syst. ii. 187, 192 (1912). No specimen has been seen, but this is stated to differ from *B. officinalis* Maxim. in the leaves being more bullate, abruptly truncate or cordate at the base and dentate. Collected by Delavay in Yunnan.

Excluded Species.

B. diversifolia Vahl. Symb. Bot. iii. 15 (1794).
=*Nicodemia diversifolia* Tenore Cat. Ort. Napol. 88 (1845).

B. incompta Linn. fil. Suppl. 123 (1781).
=*Gomphostigma incomptum* N.E. Br. in Kew Bull. 1929, 143.

B. indica Lam. Encyc. i. 513 (1785).
=*Nicodemia diversifolia* Tenore Cat. Ort. Napol. 88 (1845).

B. madagascarensis Lam. Encyc. i. 513 (1785).
=*Nicodemia madagascarensis* R. N. Parker, Forest Fl. Punjab. ed. 2, 357 (1924).

B. Missionis Benth. Scroph. Ind. 43 (1835).
=*Wendlandia Notoniana* Wall. ex Wright & Arn. Prod. 403 (1834).

B. plectranthoidea Lévl. Cat. Pl. Yunnan, 171 (1916).
=**Leucosceptrum plectranthoideum** (*Lévl.*) *Marquand* comb. nov.

B. virgata Linn. fil. Suppl. 123 (1781).
=*Gomphostigma scoparioides* Turcz. in Bull. Soc. Nat. Mosc. xvi. 53 (1843).
=*Gomphostigma virgatum* O. Kuntze Rev. Gen. iii. II. 201 (1893).

In addition to the above, the following Mascarene species are referred to the genus *Nicodemia* for the reason stated in the Introduction :—

B. candelabrum Kränzl. in Engl. Jahrb. l. Beibl. 111, 40 (1913).
B. comorensis Baker in Journ. Linn. Soc. xx. 206 (1884).
B. cuspidata Baker in Kew Bull. 1895. 113.
B. fusca Baker in Journ. Linn. Soc., Bot. xx. 205 (1884).
B. rondeletiaefolia Benth. in DC. Prod. x. 445 (1846).
B. sinuata Willd. ex Roem. & Schult. Syst. Mant. iii. 97 (1827).
B. sphaerocalyx Baker in Journ. Linn. Soc., Bot. xxii 505. (1887).
B. sphaerocephala Baker in Journ. Linn. Soc., Bot. xxi. 425 (1885).

XX.—A NEW BERBERIS FROM BURMA.

H. K. Airy-Shaw.

In view of the note in a recent issue of the Gardeners' Chronicle,* respecting the successful raising from seed (F. K. Ward 6787) of what proves to be a new species of *Berberis* of a somewhat aberrant type, it seems desirable to name and describe this plant adequately as soon as possible. Material was collected both before and after the flowering season (in May and again in October, 1926), and consequently mature expanded flowers are not represented on the specimens upon which the following description is based. This should be borne in mind when considering the description and measurements here given of the parts of the flower.

The species presents several features of interest, especially from the morphological point of view, in that it departs even further from the usual type of the genus than does its nearest ally, *Berberis insignis* Hook. fil. & Thoms., the morphology of which has already attracted attention.† It is hoped to deal more fully with these and other points in a further account, to appear in a future issue of the journal referred to above.

Berberis hypokerina‡ *Airy-Shaw*, sp. nov. (Sect. Wallichianae § Insignes), ab affini *B. insigni* Hook. fil. et Thoms. habitu humiliore, foliis ramorum longorum multo crassius coriaceis haud acuminatis subtus papilloso-ceratis albo-glaucis, nervis primariis angulum acutiorem cum costa efformantibus, foliis e ramulis abbreviatis nunquam ut videtur evolutis, petalis integris, praecipue distinguenda.

Frutex humilis, usque circiter 0·75 m. altus. *Rami* rigidi erecti subcaespitosi : *annotini* (et vetustiores) in speciminibus praesentibus 4–5 mm. diametri haud excedentes cortice cinereo-fusco plus minus fisso instructi ; *hornotini* recti teretes usque 4 mm. diametro, cortice floriferorum rubido-purpureo, sterilium (iuniorum) ochraceo-

* T. W. Bolas in Gard. Chron. lxxxvii. 186 (8th March, 1930), *sub* : "Plants New or Noteworthy."

† Hooker fil. et Thomson, Flora Indica i. 226, 227 (1855) ; C. K. Schneider in Bull. Herb. Boiss. sér. 2, v. 37, 39 (1905).

‡ Name derived from ὑπο *below* and κήρινος *waxen*, in allusion to the most prominent feature of the leaves.

brunnescente ; bases omnium ramorum (veterum aeque ac iuniorum) perulis persistentibus imbricatis, deltoideis acutis usque lanceolatis spinoso-acuminatis, usque 1·2 cm. longis circumdatae ; internodia 3·5–9·5 cm. (plerumque 5–6 cm.) longa. *Folia ramorum longorum* foliacea nec spiniformia, oblongo-elliptica, usque 12 cm. longa 6·5 cm. lata (spinis inclusis), valde coriacea rigida glaberrima, marginibus incrassatis revolutis cartilagineis regulariter sinuato-dentatis, sinubus rotundatis, dentibus utrinque 8–9 (raro usque 15) triangularibus 4–5 mm. longis spina valida pungentissima 2–3 mm. longa brunnescente terminatis ; pagina superior (e collectore) fusco-viridis, exsiccata surde olivacea levis, inferior ob rorem cereum sub lente minutissime sed distinctissime globuloso-papillosum per totam superficiem obductum, vi detersilem, splendide argenteo-alba (in foliis iunioribus rufo-glauca) : nervi costaque supra minime prominentes sed viventes fere sine dubio impressi, quod vero etiam in his speciminibus nonnunquam fit, infra conspicue nec tamen argute elevatis ; nervi primarii plerumque tot quot dentes principales angulo acutiusculo (40–45°) e costa orti circa medium bifurcati ramificatione superiore saepe costae plus minus parallela utraque cum proxima anastomosante, unde areolae subrhom-boidales vel oblique pentagonales, vena singula ab anastomosibus in quemque dentem excurrente ; petioli brevissimi 4–5 mm. longi basi crassa semiamplexicauli fere aeque lata cum laminae basi angustata conspicue articulati, infra ipsam articulationem in stipulas binas minutas subulatas nonnunquam excurrentes. *Folia ramulorum abbreviatorum* haud evoluta. *Fasciculi* axillares circiter 6–10-flori, perulis multis imbricato-congestis ovatis vel lanceolatis usque subulatis acutissimis 2–5 mm. longis laete brunneis suffulti ; pedi-celli alabastrorum glaberrimi circiter 1 cm. longi crassiusculi superne paullum ampliati ; bracteolae tres sepalis extimis arte adpressae exacte deltoideae 2 mm. longae lataeque crassae marginibus tenues apice acutae dorso obtuse carinatae. *Flores* ex alabastris tantum cogniti. *Sepala* novem, subaequalia orbiculata valde concava carnosula 2–2·5 mm. diametro quinquenervia nervis duobus exterioribus (marginalibus) quam ceteris subduplo brevioribus obscurioribus. *Petala* sex, obovato-spatulata vix 2 mm. longa, 1–1·5 mm. lata, apice integerrima, trinervia nervis lateralibus nectarium elliptico-fusiforme basin versus gerentibus. *Staminum* filamenta basi petalorum leviter adnata crassa brevissima, thecae oblongae connectivo medio angustato apice truncato paullo superatae. *Ovarium* circiter 1 mm. longum ovoideum apice contractum, stigmate sessili latissime pileiformi-capitato. *Baccae* (vix maturae) pendulae, pedicellis usque 1·5 cm. longis brunneo-aurantiacis striatis fere 1 mm. diametro gestae, ellipsoideae utrinque angustatae usque 7 mm. longae et 4 mm. diametro, stylo brevissimo stigmate 1–1·25 mm. lato. *Semina* (in fructu unico dissecto) quatuor, quorum duo tantum maturescere (ceteris abortis) videbantur, 5–6 mm. longa 2·5–3 mm. lata, applanato-subtrigona tertia facie angustissima, testa indurata brunnea. *Fructus maturi* e collectore " fusiformes, surde

subcaeruleo-violascentes, iis specierum *Mahoniae* quorundam persimiles."

North-East Upper Burma. Base Camp, Seinghku Wang, alt. c. 2700-3000 m., 29 May 1926, *F. Kingdon Ward* 6787 (Type ! Herb. Kew.) ; Valley of the Seingaku, 28° 5′ N., 97° 30′ E., alt. c. 2700-3000 m., 24 Oct. 1926, *F. Kingdon Ward* 7611.

Collector's field notes :

6787. " As seen, a small, almost dwarf shrub, with stiff branches, growing in the dense thickets of tanglewood which clothe the high ridge and precipitous face of the mountain. Leaves stiff, leathery, dark green above, brilliant silver-white beneath ; on the upper surface the midrib and lateral veins show through like inlaid malachite. Flowers not open. Stems purple, or warm red."

7611. " Young shoot of no. 6787, also fruit [immature]. The fruits are in bunches, fusiform, dull bluish violet in colour, and closely resemble those of some species of *Berberis* § *Mahonia* ; they hang down beneath the stem on short pedicels like those of most of the simple leafed Barberries. The leaves may reach a considerable size, some I saw being 4 in. long ; but the plant itself hardly ever exceeds 2–2½ feet. In the dense thickets where it grows its habit is rather obscure, but the plant sends up a number of stiff shoots, more or less erect, forming a fairly compact clump. It is commoner in this single locality (i.e. on the limestone ridge) than I had supposed, and I found it in increasing numbers as I ascended to about 10,000 [feet ; c. 3000 m.] ; but I have seen it nowhere else. It does best in shade, and is fairly common as part of the undergrowth amongst small *Rhododendron, Enkianthus, Vaccinium,* etc."

XXI.—CONTRIBUTIONS TO THE FLORA OF TROPICAL AMERICA : I. New and Less-known Species of Schlegelia.

N. Y. Sandwith.

It is interesting to note how this genus in the tribe Crescentieae of Bignoniaceae, which is certainly unlike its congeners, has a facies so strongly recalling that of the well-known *Citharexylum* in Verbenaceae that it has repeatedly provided a pitfall for botanists from the time of Linnaeus down to the present century. Thus the type specimens of *Citharexylum cinereum* L., " parasiticum scandens " of the Plantae surinamenses p. 10, no. 78 in Amoen. Acad. viii. p. 258 (1775), are the common *Schlegelia* of the section *Euschlegelia* of the Guiana forests, which was originally described and figured by Aublet as *Besleria violacea,* and later described by Miquel as *S. lilacina* and *S. elongata,* the latter being considered conspecific with the former by subsequent writers such as Seemann, K. Schumann and Pulle. This was first reported by Seemann in a paper on the Crescentiaceae in Trans. Linn. Soc. xxiii. 15 (1862), in which he treated Miquel's *Schlegelia* as a section of the genus *Tanaecium* ; it was quoted by K. Schumann in Martius' Flora Brasiliensis vol. viii.

pars ii. p. 401 (1896-7); and the identification has more recently (1923) been verified by Mr. N. E. Brown, who matches the specimens exactly with *Jenman* 4318 from the Lower Demerara River, British Guiana. Fortunately no change of name is necessitated by this mistake of Linnaeus, since the name *Citharexylum cinereum* had already been applied to another species. This earlier *Citharexylum cinereum* L. of Sp. Pl. ed. ii. 872 (1763), as can be seen from the description and the references to Patrick Browne, Plumier and Plukenet, is a true *Citharexylum*, conspecific with *C. fruticosum* L. of Systema Naturae ed. x. 1115 (1759); and *C. cinereum* L. (1763) is accordingly sunk in synonymy under *C. fruticosum* L. by O. E. Schulz in his conspectus of the West Indian species of *Citharexylum* in Urban, Symb. Antill. vi. 61 (1909).

Two recent examples of the confounding of new species of both sections of *Schlegelia* (Section *Euschlegelia* K. Schum. with a long, leafless, thyrsoid, terminal inflorescence; and section *Paratanaecium* K. Schum. with short, lateral, axillary inflorescences) with *Citharexylum* have lately come to light in the Kew Herbarium, involving in one instance a new combination and emended description, and in the other a complete description, since the plant was published as a *nomen ineditum* in a list of names and localities.

Schlegelia (*Paratanaecium*) **Ramizii** *Sandwith* sp. nov.; *S. paraensi* Ducke affinis, calycibus corollisque parvis statim distinguenda.—*Citharexylon Ramizii* Glaziou in Bull. Soc. Bot. France, lviii. Mém. iii. 545 (1911), nomen.

Frutex scandenti-epiphyticus; ramuli summi cortice generis typico praediti, 5 mm. diametro; internodia summa 2–3 cm. longa. *Folia* elliptica, apice obtusa rotundata, basi in petiolum crassum 5–8 mm. longum 2–3 mm. latum attenuata vel fere rotundata, 8–13 cm. longa, 5–6·5 cm. lata, crasse coriacea, nitida, glabra, utrinque ut in aliis speciebus valde nervosa reticulata, nervis primariis in utroque latere costae 10–12 versus marginem anastomosantibus, utrinque praesertim subtus conspicue punctata. *Inflorescentiae* axillares, breves, paniculatae, 1–2·5 cm. longae; pedunculi pedicellique pilosuli; bracteae bracteolaeque scariosae, pilosulae, lanceolato-subulatae, 1–2·5 mm. longae; pedicelli 4–7 mm. longi. *Calyx* campanulatus, glaber, 4–5 mm. longus, 3–4·5 mm. latus, truncatus atque inaequaliter 0·5 1·5 mm. lobulatus. *Corolla* " alba," extra glabra; tubus cylindricus, ad 7 mm. longus, 2–3·5 mm. latus, superne paullum ampliatus, intus circa insertionem staminum papillosus; limbus expansus circiter 1 cm. diametro, lobis rotundato-obovatis intus papillosis 4–5 mm. longis ad 3 mm. latis. *Stamina* medio tubi affixa; filamenta papillosa, circiter 1·2 mm. longa; antherae 1 mm. longae. *Ovarium* subglobosum, glabrum, 2·2 mm. longum atque diametro; stylus glaber, apice dilatatus, cum lobis 0·5 mm. longis 6 mm. longus; placentatio atque ovula numerosa generis typica. *Fructus* ad 1·2 cm. diametro.

Brazil : Rio de Janeiro ; Itamaraty near Petropolis and Tijuca, fl. March-April, *Glaziou* 15327 (type) ; 4929 (fide Glaziou, l.c., not seen). " Arbuste épiphyte, sur les arbres et les rochers."

Schlegelia (*Paratanaecium*) **Spruceana** *K. Schum.* in Mart. Fl. Bras. viii. pars ii. 400 (1896-7) ; descr. hic ampliat. *Tanaecium parasiticum* Seem. in Bonplandia iv. 127 (1856) and Trans. Linn. Soc. xxiii. 16 (1862), non Swartz.

This species of the section *Paratanaecium*, orignally found by Spruce at San Gabriel on the Rio Negro, occurs in British Guiana : forests near the Kaieteur Savannah, Potaro River, Sept.-Oct. 1881, *Jenman* 1239 ; climbing up trunks of forest trees, Macreba Falls, Kurupung River, Aug. 1925, *Altson* 363.

The description given by Schumann may be amplified as follows : racemes up to 3 cm. long ; pedicels 3–15 mm. long, pilosulous ; calyx campanulate, dark and granulate except at the paler scarious rim, sparingly pilosulous or glabrescent, of variable length like the pedicels, 4–10 mm. long, up to 9 mm. broad, truncate and entire, or very obscurely toothed ; flowers " vermilion, very fleshy " (Spruce) ; corolla tube up to 2·2 cm. long, cylindrical but slightly narrowed at each end, up to 6·5 mm. broad in the middle, papillose round the insertion of the filaments within, otherwise glabrous ; lobes very fleshy and irregular, oblong to obovate, 2–3 mm. long, up to 2·2 mm. broad, very minutely papillose under a strong lens ; stamens inserted far below the middle of the tube, 5–6 mm. above the base, 8–9 mm. long, conspicuously papillose below, otherwise glabrous ; ovary glabrous, ovoid-subglobose, up to 2·25 mm. long and 3 mm. diameter, attenuate into the style which, including the lobes, is up to 1·5 mm. long ; fruit (in Jenman's specimen) 1 cm. long, 6 mm. in diameter.

The important features of the inflorescence are the shape of the corolla tube, the small size of the fleshy lobes in proportion to that of the tube, and the position of the insertion of the filaments. The pedicels of the Guiana specimens (3–5 mm.) are always shorter than the shortest of those of Spruce's plant (6–15 mm.) but no differential value should be attached to this character on present evidence.

Schlegelia (*Paratanaecium*) **darienensis** *Sandwith* sp. nov. ; foliis partis inferioris ramulorum sterilis late ovatis cuspidatis, inflorescentiis fastigiato-cymosis plurimis in axillis foliorum parvorum secus apicem ramuli elongatum dispositis distinctissima. *Tanaecium lilacinum* Seem. in sched. ; Seem. Bot. Herald 182 (1854) excl. syn. ; Seem. in Bonplandia iv. 128 (1856) quoad pl. darien., excl. syn. ; Seem. in Hook. Journ. Bot. ix. 84 (1857) quoad pl. darien., excl. syn. omn. ; Seem. in Trans. Linn. Soc. xxiii. 16 (1862) quoad pl. darien., excl. syn. omn. ; K. Schum. in Mart. Fl. Bras. viii. pars ii. 400 (1896-7) syn. sub *S. lilacina* Miq.

Frutex scandens ; ramuli summi ad 5 mm. diametro, internodiis 3–6 cm. longis. *Folia* partis ramulorum sterilis late ovata, apice

abrupte breviter acute 0·5–1 cm. cuspidata, basi rotundata vel etiam cordata, 7–14 cm. longa, 4·5–9 cm. lata, tenuiter coriacea, glabra, subnitida, utrinque praesertim subtus nervosa reticulata, nervis supra nonnunquam impressis inconspicuis, primariis in utroque latere costae paucis distantibus circiter 6 sursum valde arcuatis denique per venulas intricatas prope marginem anastomosantibus; petiolus crassus brevis, 4–5 mm. longus, ad 4 mm. latus. *Inflorescentiae* fastigiato-cymosae, plurimae, axillis foliorum pusillorum secus apicem ramuli singularem ad 35 cm. longum per paria opposita regulariter dispositae; internodia 1–2 cm. longa; folia subsessilia, ovata, apice attenuata acutissima, basi rotundata, 1·5–2 cm. longa, 0·8–1·5 cm. lata, versus apicem sensim decresentia, ceterum eis partis ramulorum sterilis similia; cymae breviter pedunculatae, breves, densae, congestae, compositae, multiflorae, 0·7–1·5 cm. longae atque latae; pedunculi pedicellique intricati insigne lignosi vel ossei, terminales nonnunquam herbacei, minutissime puberuli, longitudine valde (2–10 mm.) variabili; bracteae bracteolaeque triangulares, puberulae, 1–2 mm. longae, ad 1·5 mm. latae. *Calyx* campanulatus, glaber, 5–7 mm. longus, 4–5 mm. latus, inaequaliter ad 1·5 mm. lobulatus. *Corolla* tubo glabro basi 2 mm. lato sursum ad 3·5 mm. latitudinem ampliato, 1 cm. longo; lobi rotundato-obovati, utrinque papillosi, 5 mm. longi, 4 mm. lati. *Stamina* paullo infra medium tubum inserta; filamenta inferne papillosa, delapsis antheris 4 mm. longa; antherae 1 mm. longae. *Ovarium* subglobosum, glabrum, 2·5 mm. longum atque diametro; stylus brevis, cum lobis ad 1·5 mm. longus, supra fructum juniorem ad 6 mm. elongatus. *Fructus* 8 mm. diametro, calyce persistente accrescente insidens.

Colombia: Cauca; Ardita, Cape Corrientes, ann. 1848, *Seemann* 1084 (type in Herb. Kew., also in Herb. Brit. Mus.); Rio Micay, Dec. 1898, *Lehmann* B.T. 555.

It seems almost unaccountable that Seemann should have identified this plant, collected by himself in Darien, with the species of the Guiana forests, which has a different kind of inflorescence and belongs to the other section of the genus. But in those days little or no material was to be seen for comparison in British herbaria. Seemann's own specimens are scrappy, and in the sheet at the British Museum all the small leaves subtending the inflorescences have fallen off. Moreover, this species does seem to connect the section *Paratanaecium* with the section *Euschlegelia* in a very interesting manner. On the label of the Kew sheet we find in Seemann's handwriting "*Tanaecium lilacinum* ! ! sp. nov." It looks as if Seemann wrote this before he discovered the existence of *Schlegelia lilacina* Miq., and then was persuaded by the coincidence of the identity of the specific epithet to identify his plant with Miquel's. His descriptions of the composite *Tanaecium lilacinum* are so vague that they might apply to either. Presumably Schumann had not seen these specimens. The locality cited by Seemann in the Botany of the Herald is Cupica, north of Cape

Corrientes, and no collecting number is given, but there can be no doubt that the plant mentioned is the species described here.

Schlegelia (*Euschlegelia*) **violacea** (*Aubl.*) *Griseb.* Fl. Brit. West Indies 445 (1861), emend. *S. lilacina* Miq. in Bot. Zeit. ii. 786 (1844); in Linnaea xxii. 74 (1849); Stirp. Surinam. 116, t. 36 sinistr. (1850); K. Schum. in Mart. Fl. Bras. viii. pars ii. 400 (1896-7). *S. elongata* Miq. in Linnaea xxii. 73 (1849); Stirp. Surinam. 118, t. 36 (1850). *Tanaecium lilacinum* Seem. loc. cit. supra sub *S. darienensis*, partim quoad syn. *Besleria violacea* Aubl. Hist. Pl. Guiane. 630, t. 254 (1775); verosimiliter etiam *B. caerulea* Aubl. l.c. 631.

This combination must be used for the well-known climber of the forests of Guiana, in spite of the fact that Grisebach's description, or the major part of it, applies to *Tabebuia stenocalyx* Sprague et Stapf, vide Urban in Fedde Repert. Spec. Nov. xiv. 304 (1916). The species is very variable in the size and shape of the leaves, the size of the calyx, and the breadth of the corolla tube. Aublet's specimen at the British Museum sets the identification beyond doubt; the leaves are 11–15 cm. long and 6–10 cm. broad, the branches of the inflorescence 1–1·5 cm. long, the calyx in the dried state 5–6 mm. long. A search for the specimen of Aublet's *Besleria caerulea*, which is presumably a colour-form of *violacea*, was unsuccessful.

The following specimens have been seen :—

French Guiana : Cayenne, *Aublet* (Herb. Brit. Mus.); *Poiteau* in Herb. Gay, a form with very long and narrow leaves. Surinam : *Hostmann* 553, 698. British Guiana : Mazaruni River, Sept. 1880, *Jenman* 697; Macreba Falls, Kurupung River, Mazaruni River, Aug. 1925, *Altson* 354; Upper Arawau River, Aruka River, North-west District, May, 1929, *Martyn* 58; Lower Demerara River, Dec. 1887, *Jenman* 4318; Essequibo River, Sept.-Oct. 1881, *Jenman* 1335; Moraballi Creek, Essequibo River, Aug. 1929, *Sandwith* 4; Kaieteur Savannah, Potaro River, Sept.-Oct. 1881, *Jenman* 838, 839.

The species was abundant in several types of forest by the Moraballi Creek, Essequibo River, climbing up the trunks by rootlets (cf. *Marcgraviaceae* spp. and *Marckea*) to the canopy, where the pinkish-mauve flowers of the terminal inflorescences could frequently be seen on the edges of clearings.

Schlegelia (*Euschlegelia*) **scandens** (*Briquet et Spruce*) *Sandwith*, comb. nov. *Citharexylum scandens* Spruce ms. in sched.; Briquet et Spruce in Bull. Herb. Boiss. iv. 341 (1896).

Brazil : Panuré, Rio Uaupes, Oct. 1852, *Spruce* 2485 (type no. in Herb. Delessert and Herb. Kew.).

The specimens immediately suggested section *Euschlegelia* of the genus *Schlegelia*, and on dissection the ovary showed the characteristic placentation and numerous ovules. It is clear that Dr. Briquet had incomplete material before him, and that he did not dissect a

mature flower and examine the ovary, which would have given him the clue to the family. His description may be further emended from the Kew material as follows :—corolla-tube up to 1·5 cm. long, 2·5 mm. broad ; lobes up to 4 mm. long and 3 mm. broad ; stamens inserted at about the middle of the tube ; ovary 2–2·5 mm. long and diam. ; style 3·5 mm. long. Spruce notes that the flowers are pinkish and odoriferous. The species is closely allied to forms of *Schlegelia violacea*, which is so plentiful in the Guiana forests, but appears to differ from them in the characters of the inflorescence ; the narrow elliptic-lanceolate leaves do not quite approach those of any sheet of *S. violacea* except Poiteau's from French Guiana, in which they are proportionately longer and more reticulate. Provisionally it is kept as a distinct species.

XXII.—MISCELLANEOUS NOTES.

Augustine Henry.—It is with great regret that we record the death, on the 23rd of March last, of Professor Augustine Henry, late Professor of Forestry at University College, Dublin.

Professor Henry was born in 1857, and, after studying medicine at Edinburgh, was for some years attached to the medical staff of the Chinese Imperial Maritime Customs. It was during this period, whilst stationed at Ichang, on the Yangtze, that he first turned his attention to botany, and it was here that he made his first collections of plants. The flora of this region was then practically unknown ; and the interest and importance of his collection established his reputation in the botanical world. From then until he resigned his post with the Chinese customs, Henry spent the whole of his leisure time and local leave in collecting and studying the native vegetation of those parts of China and Formosa in which he was stationed. He sent his collections to Kew, and, as a result of the interest which they aroused, a friendship developed between Henry and many of those at Kew, which was to last the whole of his lifetime.

The material which he collected was enumerated by Hemsley in the Index Florae Sinensis, and it can have been given to few to discover so many genera and species of plants which were new to botanical science and which were also such welcome additions for horticultural purposes.

He resigned his post in China in 1900, and having determined to devote himself to arboriculture he studied forestry at Nancy for two years. In 1907 he was appointed Reader in Forestry at the University of Cambridge, and subsequently became Professor of Forestry in the College of Science, Dublin, from which post he retired in 1926. The following appreciation is contributed by Mr. W. J. Bean :—

There were two phases in Henry's life which will keep his name from falling into oblivion. One, of course, was his work as a plant collector in China, the other, his collaboration with Henry John

Elwes in the production of "The Trees of Great Britain and Ireland."

It was in connection with the latter that I came most closely in contact with him, although I first made his personal acquaintance nearly thirty years ago. In the early years of the century he went to France to study forestry at Nancy, and in 1904 I spent about a fortnight with him in that country visiting nurseries and notable tree and shrub collections. He returned to England soon after to commence his work with Elwes on the book about Trees.

He made Kew his headquarters and was given the use of two rooms in Cambridge Cottage. As my working office was in the same building I saw a good deal of him for several years. We used to make excursions together, especially on Sundays to the parks and places near London where fine trees were known or reputed to exist.

When he commenced his work he knew comparatively little about trees cultivated in British Gardens, but by the time he had finished it he was certainly the leading authority in this country, perhaps in the world, on the particular genera which came under his and Elwes' purview. Their work deals more especially with trees of large, timber-producing size, and Henry never took much interest in the small flowering trees or in shrubs. His part of the work was almost wholly botanical. Elwes dealt with statistics, history, timber and cultivation. The first volume was published in 1905 and the final or seventh in 1913.

Henry was undoubtedly a most careful and conscientious worker. When he started on a problem he would evolve various and sometimes rather startling theories in the course of its solution, but his work as it stands to-day, seventeen years after its completion, shows that in the end he pretty nearly always found the right one. His work on such difficult genera as *Populus* and *Ulmus* was admirable, and no one has done so much as he to clear up the obscurity that surrounded the origin and identity of the hybrid poplars.

I have always thought the keys he invented for the identification of cultivated trees were particularly clever. They are based almost entirely upon characters of leaf and stem, and whilst this limitation made them much more difficult to construct it has made them particularly useful to the cultivator, because so many exotic trees do not flower until they reach a considerable age, often not at all. Personally I have often had occasion to use these keys and shall always remember their inventor with gratitude.

The joint labours of Henry and Elwes made "The Trees of Great Britain and Ireland" the finest book that has ever been published on its particular subject. Its monetary value has been increasing year by year since the final volume was issued, and it is likely to keep its present high position because it has all the components of a good book—genuinely scientific as well as practical information, numerous excellent illustrations, excellent paper and printing.

After Henry became Professor of Forestry at Cambridge, and subsequently at the College of Science in Dublin, he interested himself largely in hybrid trees. *Populus generosa* was, on his suggestion, raised at Kew by crossing *P. angulata* with the pollen of *P. trichocarpa*. He published a very interesting pamphlet on the London Plane (*Plantanus acerifolia*), in which he upheld the theory that this tree originated at or near Oxford by the hybridisation of *P. occidentalis* and *P. orientalis*.

During the many excursions I made with him and during many evenings spent in his company, I always found him a most entertaining companion. His work as a collector of plants in China provided, of course, a never failing topic of interest, but after he retired from the Chinese Customs Service about 1900 he spent much of his time in travelling –notably in North America, Spain and in the Carpathians. His main object was always to increase his knowledge of the large trees, but he took a keen interest also in the various populations, especially in the peasantry, of the countries he visited.

He possessed a good deal of the Irishman's proverbial raciness and charm, and conversation never flagged or failed in interest when he was present. He has left innumerable friends scattered over the world who will always treasure his memory and feel it a privilege to have known him.

J. R. Anderson.—We have received, with regret, the news of the death of Mr. J. R. Anderson, the veteran Naturalist of Victoria, British Columbia, on April 9th, as the result of an accident. He had nearly lost his eyesight, and was knocked down and killed instantly by a passing motor car.

Mr. Anderson devoted himself to the study of the plants of British Columbia and was keenly interested in the project of establishing a Botanic Garden at Victoria for the display of the rich native vegetation of Western North America in particular. Among his publications, "The Trees and Shrubs, Food, Medicinal and Poisonous Plants," published by the Board of Education, British Columbia, with its wealth of excellent illustrations, is a very valuable book.

When I visited British Columbia in 1926 and was the guest of the Lieutenant Governor, Mr. Randolph Bruce, Mr. Anderson met me at Victoria and took me with the Governor to see a beautiful stretch of virgin forest near Victoria which he was most anxious to have created as a reserve. The forest was a thoroughly characteristic piece of native vegetation of great charm, which ought to be preserved for all time, and it is to be hoped that steps will be taken to reserve about 1,000 acres of this forest, with its glades and rich collection of wild British Columbian plants, as a memorial to one to whom we owe so much of our knowledge of the British Columbian Flora. A.W.H.

The Botanical Name of the " Flat-crown " tree.—The tree which forms the subject of the present note received its English vernacular name from its extraordinarily flat-topped crown (recalling that of *Acacia litakunensis* Burch.), which may reach a diameter of 40 ft., often even exceeding the height of the tree itself. In virtue of this it gives, when growing gregariously, a characteristic appearance to the landscape.

The species is widely distributed through Africa—from Senegambia and Abyssinia southwards to Angola on the west and Portuguese East Africa and Natal on the east coast, extending in the latter as far south as the Umzimvubu River in Griqualand East, and occurring also in Madagascar. It might have been supposed that the nomenclature of a species so widely distributed and so well-known would long ago have been adequately investigated, but in 1919 Macbride (Contr. Gray Herb. n. s. lix. 4) found it necessary to form a new binary combination for it owing to the discovery of an earlier specific epithet than the one then in current use.

In 1835 Ernst Meyer described a new species, *Zygia fastigiata*, from specimens collected by Drège in Natal, and this name was adopted by Harvey (Fl. Cap. ii. 285 : 1861-62) for the species under consideration. Oliver, however, transferred it to *Albizzia* as *A. fastigiata* (Fl. Trop. Afr. ii. 361 : 1871), erroneously citing Ernst Meyer as the authority for the new combination, while Baillon, who placed *Albizzia* under *Acacia*, proposed (Drake, Hist. Pl. Madag. i. 71 : 1902) the name *Acacia Sassa* for the species, based on *Inga Sassa* Willd. (Sp. Pl. iv. 2, 1027 : 1806), which long antedates the specific epithet given by Ernst Meyer ; and in 1919 Macbride accordingly adopted the epithet *Sassa* under *Albizzia*. Willdenow had established his *Inga Sassa* on a plant described and figured under the vernacular name "Sassa" by Bruce, Trav. v. 27, 29, 32, tt. 4, 5 (1790). But all authorities from Willdenow onwards seem to have overlooked the existence of the still earlier name *Sassa gummifera* Gmel. (Syst. 1038 : 1791), based *also* on Bruce's plant as figured by him in his Travels, and on this name the new combination *Albizzia gummifera* (Gmel.) must now be based in accordance with International Rules, thus adding an eleventh name to the ten previously proposed for the species.

The detailed synonymy of the species is as follows :—

Albizzia gummifera (*Gmel.*) *C. A. Sm.*, comb. nov.

Sassa gummifera Gmel. Syst. 1038 (1791).

Inga Sassa Willd. Sp. Pl. iv. 2, 1027 (1806) ; DC. Prodr. ii. 440 (1825).

Mimosa Sassa Bruce e Poiret, Dict. Suppl. i. 49 (1810).

Mimosa adiantifolia Schum. & Thonn. Beskr. Pl. Guin. 322 (1827).

Zygia fastigiata E. Mey. Comm. Pl. Afr. Austr. 165 (1835) ; Harv. Gen. S. Afr. Pl. 415 (1838) ; Benth. in Hook. Lond. Journ. Bot. iii. 93 (1844) ; Harv. in Harv. & Sond. Fl. Cap. ii. 285 (1861-62) ; Harv. Gen. S. Afr. Pl. ed. 2, 93 (1868).

Zygia Sassa Benth. e Schweinf. Reliq. Kotschyanae, 10 (1868), in obs.

Albizzia fastigiata Oliv. Fl. Trop. Afr. ii. 381 (1871); Benth. in Trans. Linn. Soc. Bot. xxx. 570 (1875); Fourcade, Rep. Natal For. 106 (1889); Engl. Pflanzenw. Ost-Afr. C. t. 21 (1895); Hiern, Cat. Welw. Afr. Pl. i. 317 (1896); Wood & Evans, Natal Pl. i. 24, t. 27 (1898); Sim, For. Fl. Cape Col. 213, t. 62 (1907), & For. Fl. Port. E. Afr. 59, t. 58 (1909); Engl. & Drude, Veget. d. Erde, ix. i. 1, 325 (1910); Eyles in Trans. Roy. Soc. S. Afr. v. 4, 361 (1916); Wissensch. Ergeb. Zweit. Deut. Zentr.-Afr.-Exped. ii. 67 (1922); Marloth, Fl. S. Afr. ii. 1, 50, f. 30 (1925).

Feuilleea Sassa O. Kuntze, Rev. Gen. i. 186 (1891).

Acacia Sassa Baill. in Drake del Castillo, Hist. Pl. Madag. i. 71 (1902).

Albizzia Sassa Macbride in Contrib. Gray Herb. n.s. lix. 4 (1919); Hutchinson & Dalziel, Fl. West Trop. Afr. i. 2, 363, f. 140 (1928).

C. A. SMITH.

The Macadamia Nut. The cultivation of the comparatively little known "Queensland" or "Macadamia" nut (*Macadamia ternifolia* F. v. M.) for edible purposes (*see K.B.* 1914, p. 200) or as a potential source of oil continues to attract attention. The tree is native to subtropical Eastern Australia but has now been successfully grown in other parts of Australia, in South Africa, the southern U.S.A., certain Mediterranean countries, and the island of Hawaii. In the last-mentioned country the cultivation of the nut has been very much encouraged in recent years and is claimed to be rapidly assuming the proportions of an industry.

The original discovery of this nut-yielding tree is credited to Walter Hill, the first Director of the Brisbane Botanic Gardens, while engaged in a study of the flora of the Moreton Bay district, and the generic name was given in honour of Dr. John Macadam, who was President of the Philosophical Society of Victoria.

The tree occurs chiefly on the alluvial soils bordering rivers and creeks in the coastal districts of southern Queensland and north-eastern New South Wales. It is found in coastal scrub. In its native habitat it generally attains a height of about fifty feet with a clean straight trunk which seldom exceeds twelve inches in diameter. When grown as an orchard tree, however, it branches from near the base. Though adapted to a wide range of moisture conditions the tree cannot withstand low temperatures. A variety (var. *integrifolia*) bearing a smaller, smooth-shelled and more spherical nut is known. Among the numerous strains of *M. ternifolia* in cultivation interest is chiefly centred in those with a comparatively thin-shelled nut, for with the thick-shelled forms the difficulty in cracking and the relatively high proportion of shell to kernel are naturally undesirable factors.

Propagation has in the past been effected mainly from seed. This presents no difficulty but it has been found that, as with most

fruit- and nut-yielding trees, great variation exists in the nuts from seedling trees. Vegetative propagation is regarded as essential in order to propagate desirable or improved strains on a commercial scale. Experimental work in this direction, and on the cultural requirements of the tree generally, has been carried on at the Hawaii Agricultural Experimental Station during the last seven or eight years, and an interesting account of this work has recently been given by W. T. Pope.* At this station, rooted cuttings and side-tongue-grafting were found to be the most practical methods of vegetative propagation. It is thought that in subtropical countries, or at higher altitudes in the tropics, the resistance of the tree to cold, and of the root-system to low soil temperature, may call for investigation into the use of more resistant root-stocks. In this connection it is possible that other species of *Macadamia* in Australia, not at present of interest, may prove of value.

Experience in Hawaii has shown that where strong winds prevail protection to the orchards in the form of wind-breaks is essential. It has been found that young trees, particularly at the age of two to five years, are very liable to be blown down, not as a result of being uprooted but owing to their breaking off in the ground immediately above the spread of the root-system. The planting distance recommended is 30 ft. by 30 ft. which allows of about 48 trees per acre, young trees of twelve to eighteen months, previously established in pots or tins, being used. In windy localities it is advisable for young trees to be firmly supported by means of stakes. Early pruning is advisable in order that the trees should develop into a desirable and symmetrical shape. Wiring down of the early first-formed erect branches has proved effective in leading to the formation of a flat-spreading top.

The age of bearing and the period of flowering and fruit-formation varies very much with seedling trees and is of course influenced by environmental conditions. Trees have been known to commence flowering in their fourth year but it is not until about the seventh year that bearing generally commences. Under less favourable conditions bearing may not take place until the tenth year or even later. The harvesting of the nuts is a simple matter. As the fruits ripen they split open and the nuts fall to the ground where they can be collected. If left on the ground and allowed to come into contact with moisture they soon commence to germinate. If gathered as soon as they fall from the trees they are considered to be too fresh for immediate use, but can be eaten after being stored for a few weeks. Storage should be effected under perfectly dry conditions and precautions taken against mice and insects. There are at the present time very few definite records relating to yield. It is apparent, however, that the yield varies greatly and that differences

* "The Macadamia Nut in Hawaii," W. T. Pope, Horticulturist, Hawaii Agric. Exp. Station, Honolulu, Hawaii, Bulletin No. 59. 23 pages. (Nov. 1929).

are due to both seedling variation and to environment. It is held that under favourable conditions mature trees in Hawaii average about three hundred pounds of nuts annually. Nut production with the *Macadamia* is believed to compare favourably with that of the pecan, the walnut and the almond. A growing demand is said to have arisen in Australia for the nuts, which are collected from the forests and from the groves of farmers. Grading is not customary and prices in Australia are quoted as being in the neighbourhood of 6d. to 10d. wholesale and 1s. to 1s. 6d. retail, per pound.

The kernels are rich in an edible non-drying oil (65-75 per cent.), and are similar in general composition to most other edible nuts. The oil, which is almost colourless and tasteless, possesses a faint odour and has a low iodine value. According to Smith and Meston* the kernels are free from starch and from cyanogenetic glucoside, and contain 5·6 per cent. of non-reducing sugar. The oil is reputed to compare favourably with the best grades of edible olive oil and to be capable of being used in place of them for salads, high grade soap-making, and medicinally. The kernel possesses a superior flavour and is excellent as a dessert nut, as a salted nut, and for high-class confectionery. F.N.H.

The Gnetales.†—This is one of the important series of Cambridge Botanical Handbooks edited by Prof. A. C. Seward, who supplies a preface to the present volume, explaining its history. Prof. Pearson, who undertook to write a general account of the Gnetales for the series of handbooks referred to above, died in 1916, having written the greater part of the book, but leaving the final chapter and the revision of the earlier part of the work uncompleted. The revision of the text has been carried out by Mrs. Thoday, who also assisted the editor in preparing the work for the press.

The book is divided into five chapters, the subjects being :— (1) Habit, Distribution, Ecology and Taxonomy ; (2) Vegetative Morphology and Anatomy ; (3) the Inflorescence and Flower ; (4) Reproduction ; and (5) Theoretical. Such portions of Pearson's manuscript as appeared to be in final form are published with as little alteration as possible, supplementary matter derived from more recent literature being added, and square brackets being used to indicate sections inserted by Mrs. Thoday.

The descriptive part presents all available information of importance regarding the morphology of the three genera *Ephedra*, *Gnetum*, and *Welwitschia*, which has a bearing on their relationships. The work is very fully supplied with references to the literature quoted in the text, and is well illustrated by figures, many of which

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* "Some Oil-Bearing Seeds indigenous to Queensland," R. F. Smith and L. A. Meston. Proc. Roy. Soc. Queensland, 26, pp. 15–17.

† Gnetales, by the late H. H. W. Pearson. The University Press, Cambridge, 1929, pp. vi + 194, frontispiece, plates 3, figures 90, tables 5. Price 18*s*. net.

are taken from Pearson's published researches. It will be of great value to those studying the morphology of the Gymnosperms, and also to anyone carrying out further research work on the Gnetales.

In the extremely useful and interesting final chapter, the subjects discussed are the inter-relationships of the Gnetales, the comparative morphology of the inflorescence and flower, the gametophyte and trophophyte, and the relationships of the Gnetales to other groups, the varied opinions of different authors on the questions involved being passed in review.

The fact that so many problems have to be left unsolved indicates, to some extent, the need for further research, and also the isolated systematic position of the Gnetales. L.A.B.

Orchids for the outdoor garden.*—This ambitious work of 467 pages describes in a very concise manner 977 species of orchids. To many this will seem to be far beyond the number possible of cultivation out-of-doors in this country, and many of them are certainly not in cultivation as hardy orchids at present. The book, which contains twenty-two full-page illustrations by the author, is printed on excellent paper and is well bound. The introduction indicates the more important books and periodicals consulted in the work of compilation. There is a plate illustrating the various parts of an orchid flower, an excellent glossary of botanical terms, and sections on the propagation, protection and importation of hardy orchids. The book is well indexed, but it is a pity that it is not more fully illustrated, for the very excellent plates are a considerable help in the identification of the various genera and species. It is written for the use of the amateur gardener, but it will provide a fund of information for all those interested in outdoor orchid culture, especially those favoured persons owning gardens on our westerly and south-westerly coasts where conditions are much more favourable than elsewhere. Except in such situations it is doubtful whether many of the species described as hardy will ever be grown with success, though there can be little doubt that many of the orchids now treated as tender are quite hardy out-of-doors in our islands under suitable conditions.

How to Grow Roses.†—This comprehensive handbook deals with the various phases of rose cultivation in a very clear and concise manner, and includes chapters on the use of the various classes of roses in the garden, the location and preparation of sites and planting of the beds. Concise yet full details are given of the various operations, including propagation, pruning and training, also pro-

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*By A. W. Darnell. L. Reeve & Co., Ltd., Lloyds Bank Buildings, Bank Street, Ashford, Kent, 1930, pp. xx + 467, plates 21, 1 coloured. Price £2 2*s.* 0*d.*

†By Robert Pyle, J. Horace McFarland & G. A. Stevens. The Macmillan Company, New York, 1930, pp. 210, plates coloured 33, half-tone 30. Price 8*s.* 6*d.*

tection during the winter, which practice is so important in many parts of the United States of America. The control of diseases and insect pests is also fully dealt with.

There is a long list with brief descriptions of the best species and garden varieties. Separate lists are also given of the varieties most suitable for different parts of the States.

An interesting feature is a chapter giving a complete list, so far as is known, of all important books and pamphlets dealing with the Rose, and the various libraries and institutions in the U.S.A. where they may be seen and consulted.

The numerous illustrations in colour and in black and white are generally of a high standard.

Plant Proteases.*—A pamphlet by Professor S. H. Vines, summarizing in a useful manner his researches on protein digestion, published in the Annals of Botany between 1897 and 1910, has been received. It is now accepted, partly as a result of the pioneer work of the author, that various plant-extracts digest protein ; that the higher proteins (fibrin, albumin, etc.) are digested to albumoses and peptones ; that the proteoses (albumoses and peptones) are digested to amino-acids, the well-known tryptophane-reaction giving evidence that this decomposition has taken place. It has, however, been disputed that two enzymes, the one a protein-digesting " pepsin " and the other peptone-digesting " erepsin," are involved in the digestive processes. Professor Willstätter, for example, upholds the view that the two digestive processes are effected by one and the same enzyme. The latter part of the pamphlet gives reasons for the author's belief that Professor Willstätter's conclusions are not final.

W.B.T.

Fungous Diseases of Plants.†—In 1927-28 Dr. Eriksson published, in two parts, a second German edition of his work of 1912 which was entitled " Fungoid Diseases of Agricultural Plants." Part I dealt with agricultural plants, while Part II considered diseases of garden and ornamental plants and thus much enlarged the scope of the original work. Dr. Goodwin's translation includes the whole in one volume, hence a certain amount of rearrangement and condensation has been necessary, to the improvement of the work as a whole. Further, in the English edition some new material is included which was not available at the time of publication of the German edition, notably in regard to cereal and grass rusts and certain diseases of peach, chestnut and elm.

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*The Proteases of Plants. A record and a reply, by S. H. Vines, F.R.S. Macmillan & Co., Ltd., St. Martin's Street, London, 1930, pp. 32. 1*s.* net.

†Fungous Diseases of Plants in Agriculture, Horticulture and Forestry. By Dr. Jakob Eriksson. Second Edition, translated from the German by Dr. William Goodwin. London, Baillière, Tindall & Cox, 1930, pp. vi + 526, 399 figs. Price 35*s.* net.

After a very brief introduction the various chapters deal each with special groups of fungi, and in each group the diseases are arranged according to the host plants. After the description of a disease a useful list of references is given. These are, however, in some cases not up-to-date, and it is difficult to judge whether certain omissions are deliberate or due to oversight. The use of such names as *Polyporus radiciperda* (Hart.) Rostr. and *Phoma abietina* Hart. may probably be attributed to unfamiliarity with modern systematic work, but the author's repetition of his view of 1915 as to specific differences between *Rhizoctonia violacea* Tul., *R. Medicaginis* DC., *R. Asparagi* Fuck., and *R. Crocorum* DC., with no reference at all to more recent work, which has all tended to prove their identity, appears to be due to the same " weary persistence " with which he still keeps up his mycoplasm theory, now discredited by the majority of botanists.

The translation appears to be very well done, and in clearness of print and illustrations the publishers have greatly improved on the German edition. Misprints are very few, the most obvious one being the heading of the chapter " Perisoporiaceae " (p. 304) for Perisporiaceae, a mistake which has been repeated in the Contents.

E.M.W.

Seedless Pawpaws.—The presence of seedless fruits in the Pawpaw (*Carica papaya* L.) is not of uncommon occurrence. Such fruits are generally considerably smaller than the normal seeded fruits, but are otherwise similar and develop and ripen in the normal fashion. Conflicting views have existed as to the nature of these fruits and their development, whether lack of seeds is due to lack of pollination or whether pollination takes place but not fertilization. Cheema and Dani* working on isolated female trees in the Punjab found that fruit formation occurred but that all the fruits were seedless. Partial pollination was found to result in partial seed-setting, the carpels in which seed was " set " corresponding to the stigma branches which had been pollinated. The weight of the fruit was found to be more or less proportionate to the number of seeds set. Their observations do not appear to bear out the contention put forward by other observers that the parthenocarpic tendency is inherited.

The peculiarities of sex in the Pawpaw are exhibited in many ways. The interesting teratological phenomenon of intra-ovarial fruits has often been recorded. These intra-ovarial fruits, which occur on the placentae, cannot with certainty be regarded as metamorphosed ovules. It is possible they arise from buds which develop adventitiously in places which would normally be occupied by ovules. In some cases these intra-ovarial fruits are exact models in miniature of the normal fruits.

F.N.H.

*Agric. Jour. of India. Vol. xxiv, Pt. iii, pp. 206–207.

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